EV530

(ENAC : J100/300)

VERTICAL MACHINING CENTER

MAINTENANCE MANUAL

ENSHU LIMITED

No. 20000205 (E-1)

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PREFACE

PLEASE READ THIS CAREFULLY BEFORE OPERATING THE MACHINING CENTER.

The instruction manual for this machining center is divided into two parts, an "Operation" section for persons running the machinery, and a "Maintenance" section for persons handling installation, preparation, and maintenance of the equipment.

Both the "Operation" and "Maintenance" sections contain fundamental procedures concerning handling of the equipment, and are designed for persons using a machining center for the first time, as well as persons using this particular machine for the first time.

This Maintenance manual describes the specifications, installation, preparation for operation, maintenance, and handling of breakdowns for a machining center with standard specifications.

If optional specifications have been selected, there may be some features which differ from the descriptions in this manual. Please refer to the appendix at the end of this manual and to the instruction manual provided with the optional equipment.

Maintenance procedures involve a variety of diverse operations, covering a range from extremely simple operations to those complex enough to require considerable engineering expertise. This instruction manual contains the material judged to be the absolute minimum knowledge required in order to operate the equipment.

For information pertaining to operation of the machinery, please refer to the "Operation " instruction manual. For details concerning handling, programming and maintenance of the control unit, refer to the instruction manual (YASNAC J100/300) provided by the control unit manufacturer in addition to this maintenance manual.

■ There may be instances where the contents of this instruction manual differ slightly from the actual equipment due to improvements in the machine. Please contact ENSHU concerning any oversights, misprints or other items which come to your attention.

■ Copying of all or any part of this instruction manual without permission is strictly prohibited.

PRECAUTIONS TO OBSERVE FOR SAFE HANDLING OF THE MACHINE

● This machining center should only be operated by persons who possess fundamental mechanical and electrical knowledge and sufficient experience related to machine tools.

☐ Enshu will not bear responsibility for any accidents (damage to the machine or personal injury) caused as a result of persons without adequate knowledge or experience operating the machinery.

● This machining center is used to machine many different kinds of workpieces. The owner is responsible for thoroughly understanding the capacity of the machine and machining workpieces under the proper conditions (spindle speeds, cutting feed, cutting depth, etc.).

☐ Enshu will not bear responsibility for any accidents (damage to the machine or personal injury) or defects in precision caused by inappropriate machining conditions or errors in operation.

● A variety of safety devices are provided for this machining center. Before operating or performing maintenance on the machine, study the instruction manual by Enshu and any manuals provided by the manufacturers of the control device, and make sure you thoroughly understand the functions and necessity of these safety devices.

☐ Enshu will not bear responsibility for any accidents (damage to the machine or personal injury) caused by using a machine in which these safety devices have been removed or modified.

● The capabilities of this machining center are limited to the range of functions described in this instruction manual.
The machine is not to be used for any functions other than the ones included in the manual.

❐ The owner bears full responsibility for any changing of specifications or remodeling of the machine which was done without consulting this company. Enshu will not bear responsibility for any problems caused by such changes on the part of the owner.

● All the necessary instruction manuals are provided with this machining center. Do not operate or perform maintenance on the machine until you have read and thoroughly understood the contents of the operator's manual, maintenance manual, and any other instructions provided.

❐ Enshu will not bear responsibility for any accidents (damage to the machine or personal injury) or other problems caused by operating or performing maintenance on the machine without having read and understood the contents of these manuals.

PRECAUTIONS REGARDING CUTTING FLUID

There are two types of cutting fluid; an oil-based fluid and a water-soluble one. When the machine is operated using the former, special care must be taken to avoid hazardous situations. The precaution points are summarized below. Re-check to ensure safety.

⚠ CAUTION

1. **When the machine is operated using an oil-based cutting fluid, there is a danger of fire due to the machine parts overheating.**
2. **The machine must be attended by the operator throughout the operation, and the operator must take appropriate protective actions to prevent fires from occurring.**
3. **In case of unmanned operation, it is recommended that the machine be provided with a fire alarm system and an automatic fire extinguisher.**

In addition to the above, detailed descriptions of the basic safety rules are given in the next chapter. Read these carefully and follow them strictly.

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PRECAUTIONS REGARDING SAFETY

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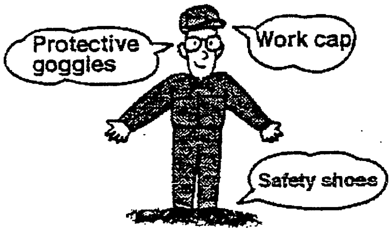
The safety precautions listed below are intended to prevent human injury or mechanical damage caused by accidents. These precautions apply to the setup and operation of the main unit and of safety devices, so operators should read them carefully and make sure they are put into practice, rather than relying solely on safety devices themselves.

1. OVERALL SAFETY PRECAUTIONS

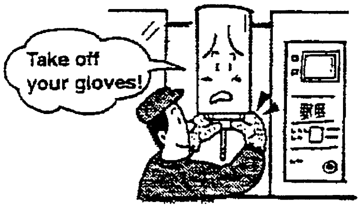
1 When working, wear protective clothing appropriate for safety (safety shoes, work cap, protective goggles, etc.). Absolutely do not operate the machinery under the influence of alcohol or drugs.



2 If your hair is long, tie it back to keep it away from the machinery. Make sure your work cap is worn properly, and that your sleeves and cuffs are properly fastened. Wear the proper clothes for working.

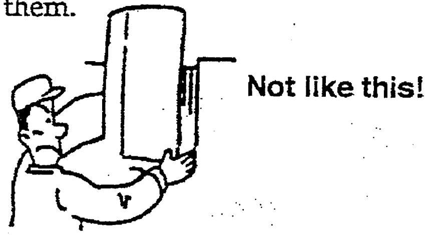
Wear them properly!

3 Do not wear gloves when operating the equipment.

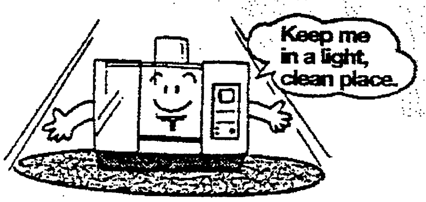

Take off your gloves!

PRECAUTIONS REGARDING SAFETY

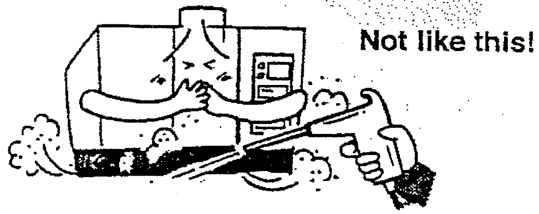
4 Never remove safety devices, interlocks, or safety covers from the equipment. It is dangerous to run the machine without them.


Not like this!

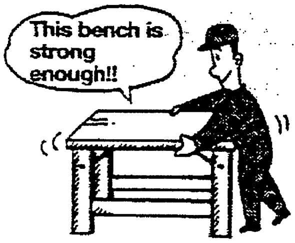
5 Make sure the area around the equipment is adequately illuminated and the floor is dry. Keep the area organized so there are no obstacles lying around on the floor. The surroundings should be neat and clean.


Keep me in a light, clean place.

6 The main unit, power control board, NC equipment and the floor around the equipment should be kept free of dust and chippings. Avoid using compressed air to clean the equipment and area.

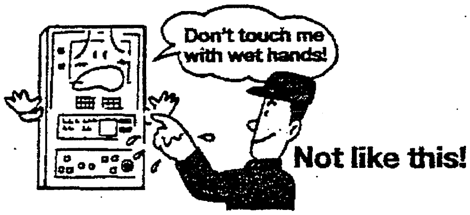

Not like this!

7 Workbenches set up near the equipment must be strong and sturdy, and their surfaces treated with non-skid material.

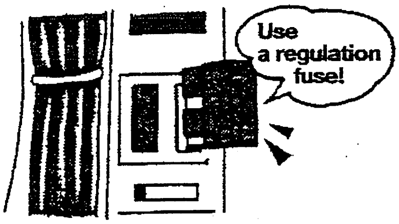

This bench is strong enough!!

PRECAUTIONS REGARDING SAFETY

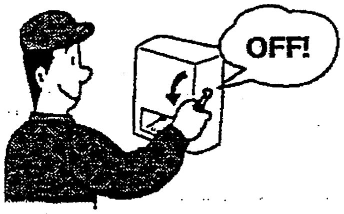
8 Be careful of high voltages. Never touch switches with wet hands.


Don't touch me with wet hands!
Not like this!

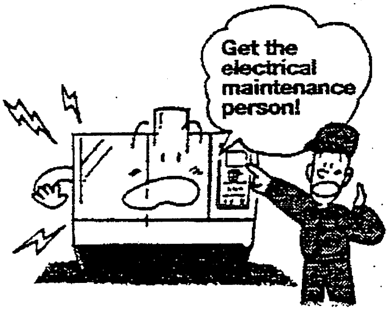
9 Use only fuses of the specified rating.


Use a regulation fuse!

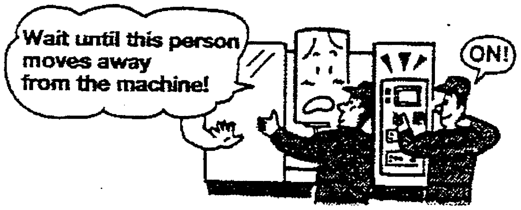
10 When replacing fuses, turn off the main power supply first.



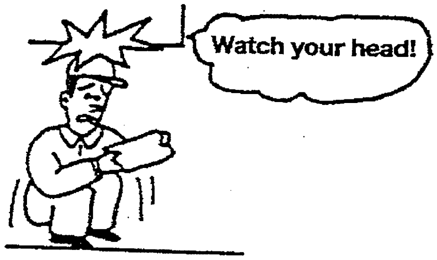
11 Any electrical problems should be handled by the person responsible for electrical maintenance. Electrical construction should be done by a person who is licensed to do such work.


Get the electrical maintenance person!

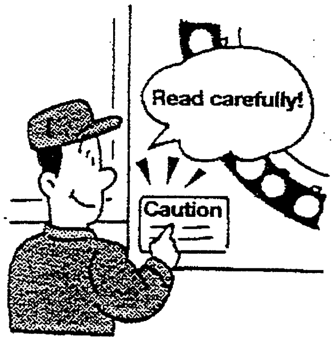
12 When you are about to turn ON the power or to operate any controls on the control panel, make absolutely sure that no person is working inside the machine or within the machine's working radius. Disregarding this precaution may result in serious personal injury or costly damage to the machine.


Wait until this person moves away from the machine!
ON!

13 When standing up near the machine,be careful not to bump your head on the machine or the control device.


Watch your head!

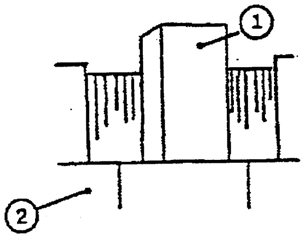
14 Keep all warning labels and caution plates attached to the machine clean and in good condition and follow them strictly.



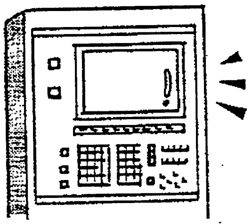
2. PRECAUTIONS FOR SAFETY DEVICES

Protective covers and interlocks, and other safety devices, are provided for the safety of the operator and to protect the machine. Never operate the machinery if these are not in effect or have been removed. Running the machine without safety devices could cause serious personal injury due to unexpected machine movements.

1 Various safety covers
(1) Head cover (2) Splashguard, Door and Magazine cover



2 Do not change the parameters of the stored stroke limits. Changing them carelessly could cause the machine to run out of control.



3 Check the position of the emergency stop pushbutton switch. If you sense danger, press it immediately.

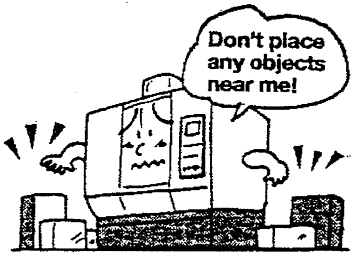
3. PRECAUTIONS REGARDING OPERATION

Read this manual thoroughly before operating the equipment for the first time. It is recommended that a service person from the manufacturer be present the first time the equipment is operated. Since every chapter contains precautions regarding operation, you should become familiar with the entire manual before handling the equipment.

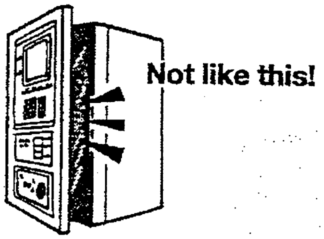
(1) PRECAUTIONS FOR OPERATING THE EQUIPMENT SAFELY

Before turning on power

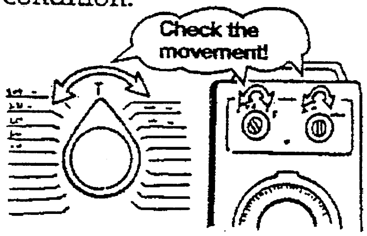
1 Make sure that there are no objects lying on the floor around the equipment, and that no one is within the movable range of the machine.


Don't place any objects near me!

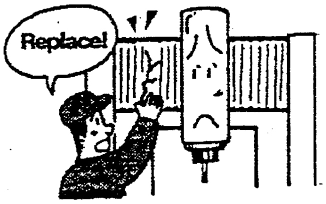
2 Check that the doors to the operation and control boxes are closed.


Not like this!

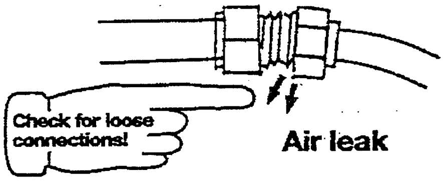
3 All operation levers and switches should be in good working condition.


Check the movement!

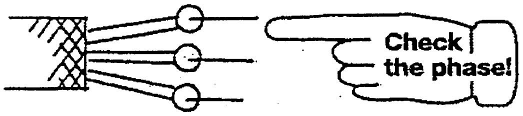
4 Cables should be in good condition, with no cracks or breaks. Replace torn or broken wipers, bellows, and winding covers.



5 Make sure that there are no loose connectors, hydraulic hoses, air pipes, or bolts.

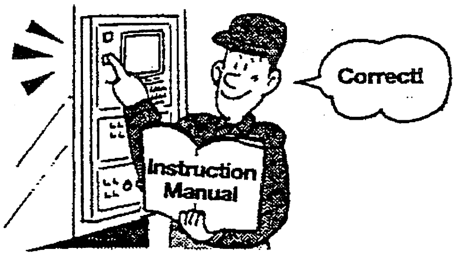


6 Check the voltage and capacity of the power source, and check the phase of the three-phase current.

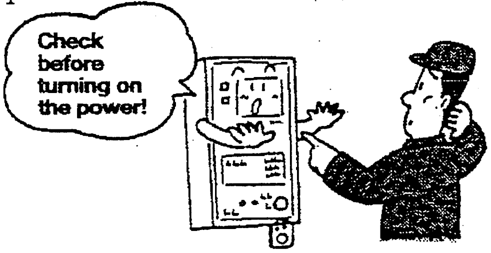

Check the phase!

Operation

1 Use the correct operation procedures, following the instruction manual.

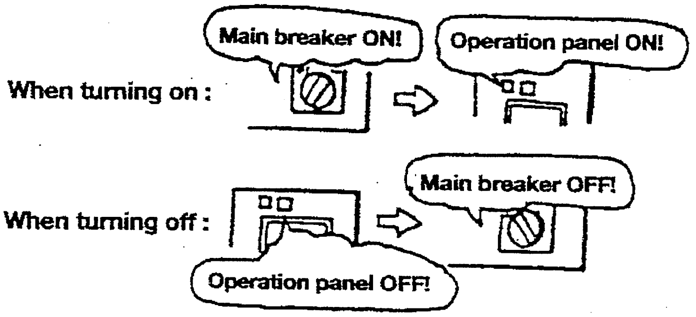


2 Before turning on the power, check the inspection and operation items.

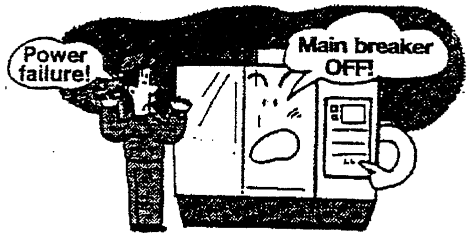

Check before turning on the power!

When turning the power on or off

1 To turn on the power, first set the main breaker to "ON" and then the power supply switch on the operation panel to "ON". When turning off the power, first turn the power supply switch on the operation panel to "OFF" and then turn off the main breaker.


Main breaker ON!
Operation panel ON!
When turning on :
Main breaker OFF!
When turning off :
Operation panel OFF!

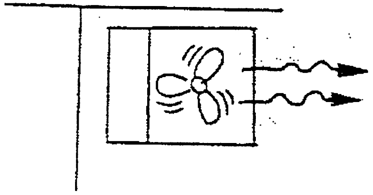
2 When a power failure occurs, immediately turn the main breaker to "OFF". If the power changes abnormally due to a thunderbolt, for example, stop the machine.


Power failure!
Main breaker OFF!

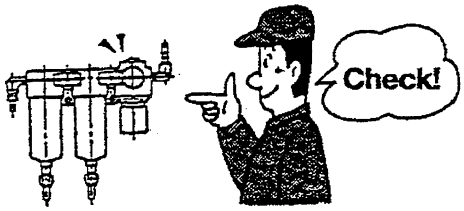
3 When operation is finished, turn off the main breaker before leaving from the machine.

Main breaker is off. Finished!

4 After turning on the power, check to make sure that all pump motors and fan motors are working correctly.



5 Before running the machine, check to see that the values shown on all the gauges (hydraulic, lubrication, air) are correct.

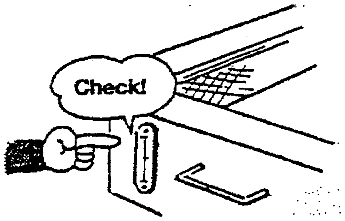


(2) PRECAUTIONS REGARDING CUTTING FLUID

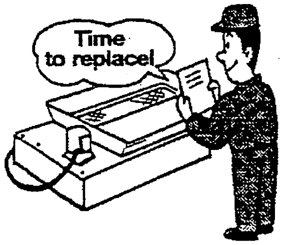
1 The use of a water-soluble coolant is recommended.

- When the machine is operated using an oil-based cutting fluid, there is a danger of fire due to the machine parts overheating.
- The machine must be attended by the operator throughout the operation, and the operator must take appropriate protective actions to prevent fires from occurring.
- In case of unmanned operation, it is recommended that the machine be provided with a fire alarm system and an automatic fire extinguisher.

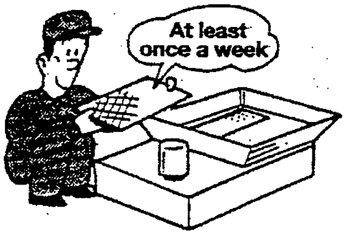
2 Check the level of the cutting fluid before beginning operation, and replenish it if the level is low.



3 Replace cutting fluid whenever necessary.

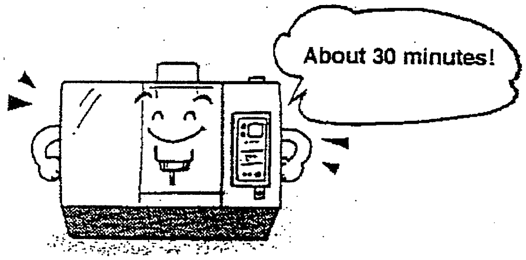

Time to replace!

4 The filter for the cutting fluid should be cleaned at least once a week.

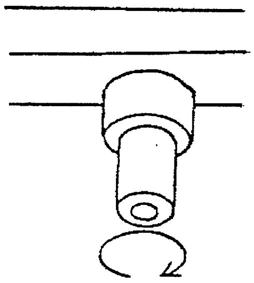

At least once a week

(3) WARMING UP

1 To prevent abnormal wear of the machinery and to maintain precision and stability when machining, the machine should be warmed up for approximately 30 minutes before starting the machining operation.

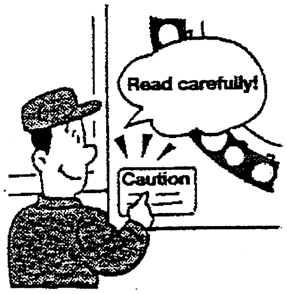

About 30 minutes!

2 After turning on the power, execute a spindle warmup run and an ATC dry run.

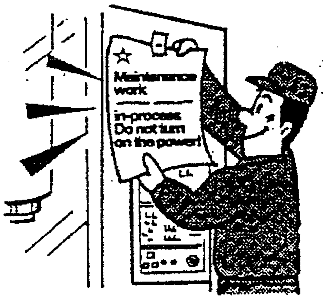


(4) PRECAUTIONS REGARDING MAINTENANCE

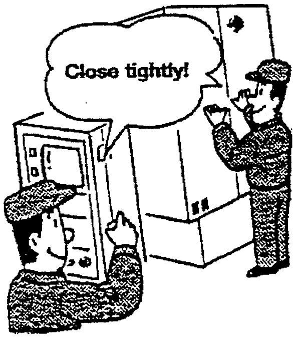
1 Read the caution plates attached to the machine carefully and observe these cautions at all times.
Be careful that caution plates do not get dirty, scratched, or detached from the machine. If caution plates become hard to read for any reason, please contact us for replacement.



2 When performing maintenance work on the machine, first shut off the power following the procedures described later in this manual, and check carefully to make sure everything is off before beginning the work. Also, post warning signs to keep other people from operating the machine while maintenance work is in progress.

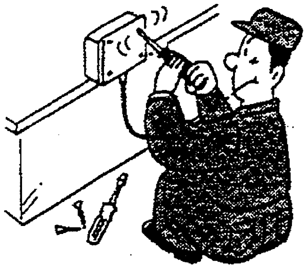


3 All doors and covers should remain closed except when adjustments are being carried out. Be especially careful with doors to the control box and the operation box.

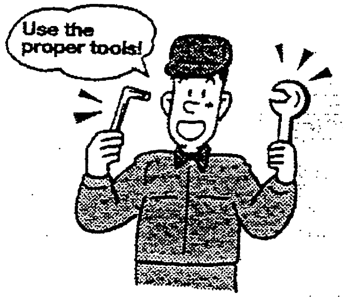

Close tightly!

4 Never remove or modify the limit switches defining axes' strokes, or the mechanisms and electrical circuits installed for safety.

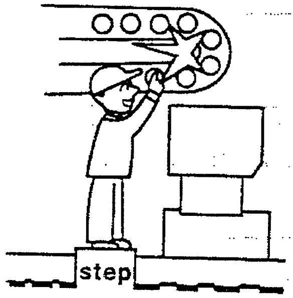
Not like this!



5 Use the specified spanners and wrenches for adjustments and repairs.

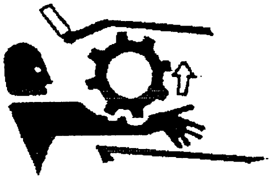

Use the proper tools!

6 Do not operate the magazine while working on the step to carry out the magazine maintenance. It is very dangerous, and neglecting this could cause a serious injury to the personnel.

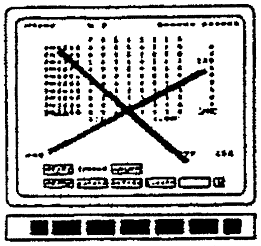


7 Do not get up on the covers to the pallet, the table, or other parts. They are slippery due to oil, and damage to the covers or unforeseen personal injuries could occur.

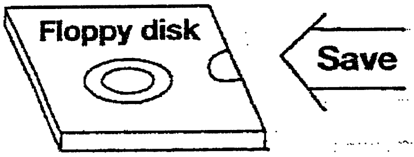
8 Absolutely do not put your hands or feet inside the chip conveyor while it is operating.



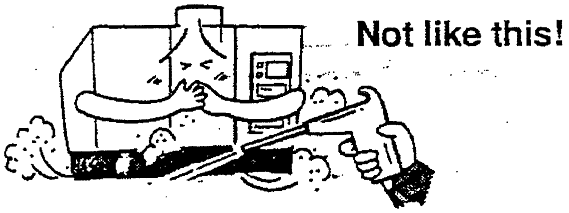
9 Do not change the parameter settings. If they need to be changed, make sure to contact Enshu.



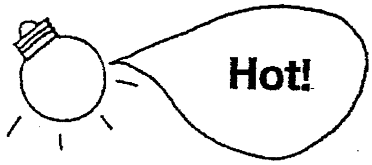
10 The programs registered in memory or the pre-set parameters may occasionally be lost for some reason, so always back up your data and save it on a floppy disk.



11 To clean the spindle parts, wipe them with a soft cloth. Do not use an air gun, as this would cause coolant to get into the bearing unit and shorten the life of the bearings.


Not like this!

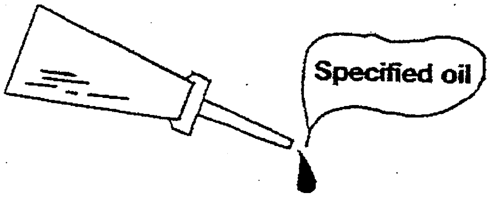
12 The solenoid and the work lamp heat up during operation. After turning off the power, wait a while before touching these parts. If you touch them immediately you could get burned.



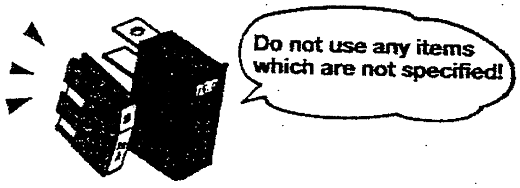
13 Periodically clean all the fans and filters.

Once a week or more.

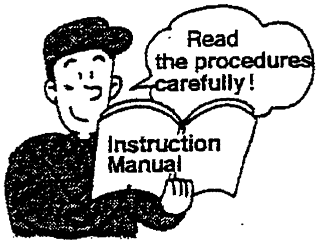
14 Always use clean lubricating oil of the specified type. Also, periodically clean the tank and the filter.



15 When replacing parts, always use the genuine parts specified by this company. If any other parts are used, the machine may not function correctly.

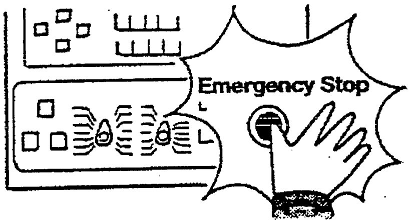

Do not use any items which are not specified!

16 Carry out daily and periodical inspections following the instructions given in the manual.

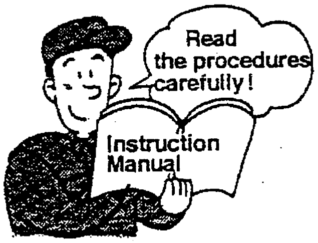


(5) PRECAUTIONS REGARDING OPERATION

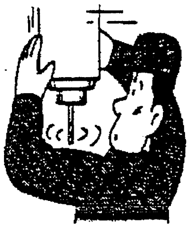
1 Be completely familiar with the position of the Emergency Stop button so that you can press it instantly if necessary.



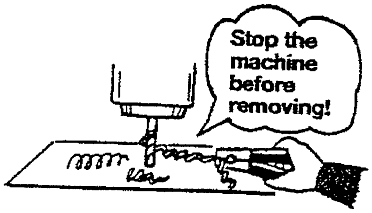
2 Follow the procedures outlined in the manual to start up the equipment.



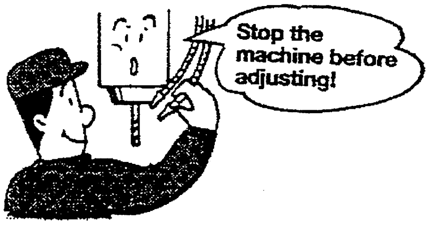
3 During operation, keep your hands and head away from the spindle, ATC, magazine, and other moving parts.


Not like this!

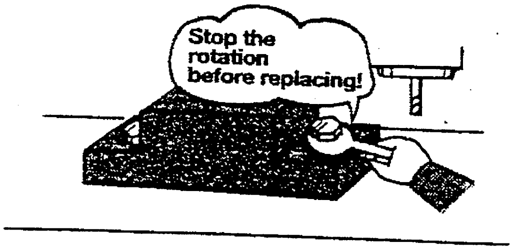
4 When removing chippings that have adhered to tools or have fallen onto the work table, it is dangerous to pick them up and pull them towards you with your hand. Before removing these chippings, make sure all rotating and moving parts of the machine have stopped.


Stop the machine before removing!

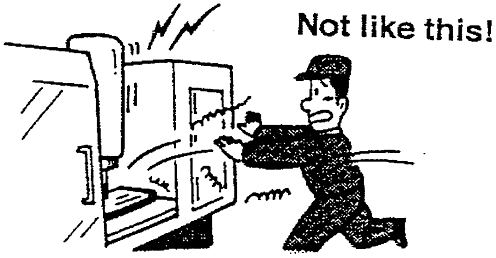
5 Do not adjust the position of the cutting fluid nozzle until you have stopped all rotating and moving parts.


Stop the machine before adjusting!

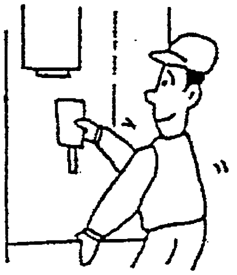
6 When attaching to or removing workpieces from a machine which is not equipped with a pallet changer, stop the rotation of the tool and stay as far away from the tool as possible.


Stop the rotation before replacing!

7 Never operate the machine without safety covers in place. Also be sure to close their door(s), if provided.

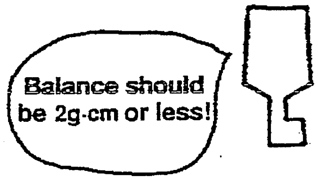

Not like this!

8 Install the tool in the holder outside the machine.

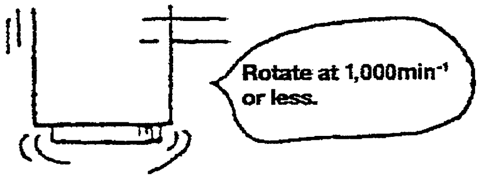


Not like this!

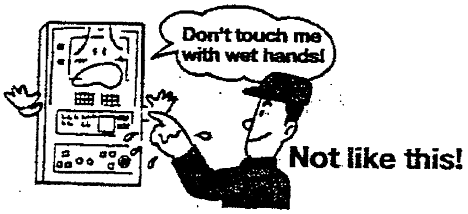
9 The balance of the tool should be 2g·cm or less. If the balance quality is unclear, gradually increase the rotation from a slow speed. If abnormal vibration occurs, stop the spindle and check the tool balance.


Balance should be 2g·cm or less!

10 When the spindle is required to run without a tool, rotate it at 1,000min^{-1} or less.


Rotate at 1,000min^{-1} or less.

11 Be very cautious about high voltage. In particular, do not touch any of the switches with wet hands.

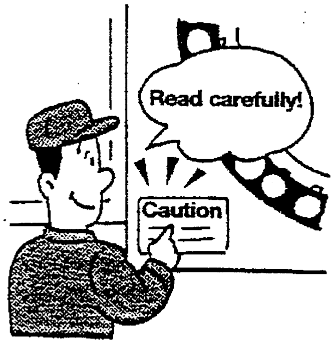

Don't touch me with wet hands!
Not like this!

12 When turning on the power or operating the control panel, be extremely careful to make sure that no one is within the movable range of the machine. Careless operation of the machine could not only damage the machinery but could also cause serious personal injuries.

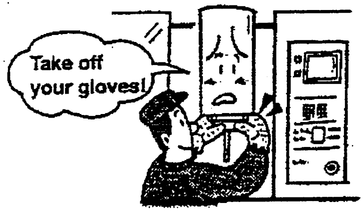
Wait until this person moves away from the machine!
ON!

13 When working, wear protective clothing appropriate for safety (safety shoes, work cap, protective goggles, etc.). Absolutely do not operate the machinery under the influence of alcohol or drugs.

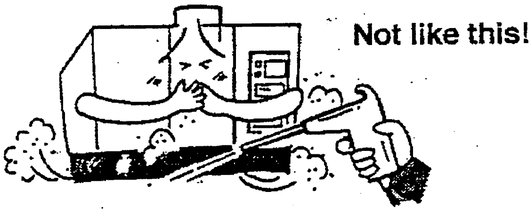
14 Keep all warning labels and caution plates attached to the machine clean and in good condition and strictly follow the instructions on them.



15 Do not wear gloves when operating the machine.



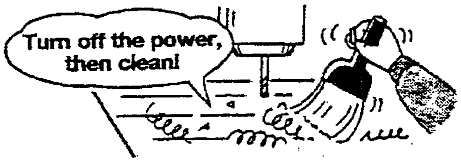
16 Remove any chippings and trash from the floor around the main unit, the control box, and the NC unit. Do not use compressed air to clean the units or surrounding area.


Not like this!

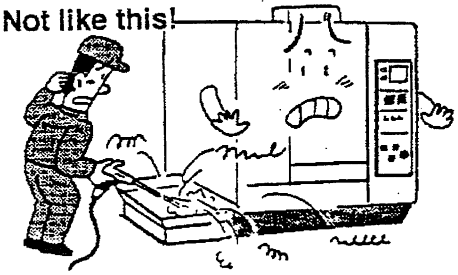
(6) PRECAUTIONS WHEN WORK IS FINISHED

1 When the work has been completed, the power should always be turned off first, following the procedures described later in this manual, and the various parts of the machine, such as the surface of the worktable, cleaned carefully.

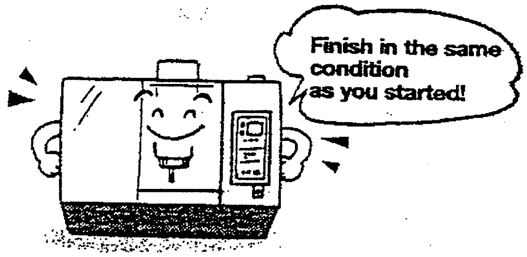
This is particularly important if the work involves using water-soluble cutting fluid.



2 Do not use an air gun for cleaning the machine.


Not like this!

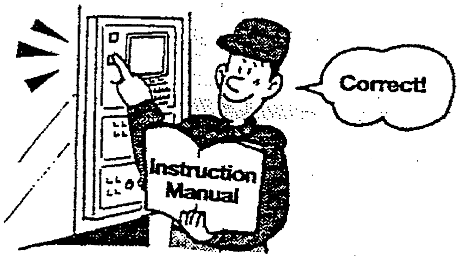
3 Check to make sure that each part is in the same condition it was in when operation was begun.


Finish in the same condition as you started!

4 When work is finished and you leave the machine, turn off the main breaker also.

Main breaker is off. Finished!

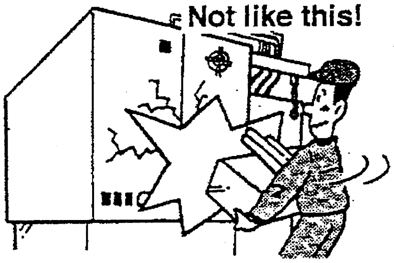
5 Use the correct operation procedures according to the instruction manual.



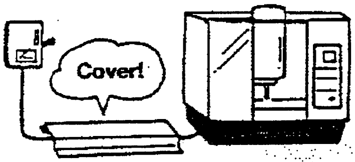
4. PRECAUTIONS REGARDING ELECTRICAL EQUIPMENT AND NC DEVICES

When handling electrical equipment or NC devices, please pay particular attention to the following items.

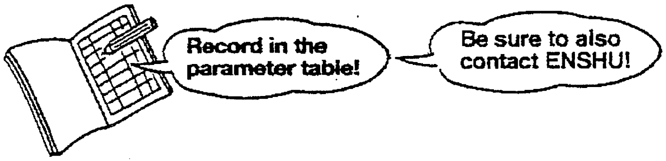
1 Avoid shock or impact to the NC devices, power control box, and other units.


Not like this!

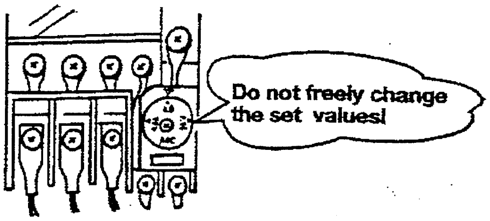
2 Make sure the primary wiring meets the size requirements specified in this manual. Avoid using a cord that is too long. If routing the wiring on the floor is unavoidable, cover it to protect it from damage due to chippings and other causes.



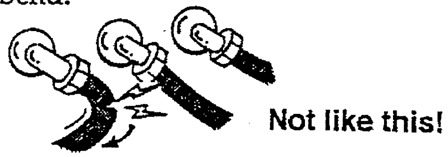
3 If the parameters are changed after the machine is installed, always make a record of the change in the appended parameter table.


Record in the parameter table!
Be sure to also contact ENSHU!

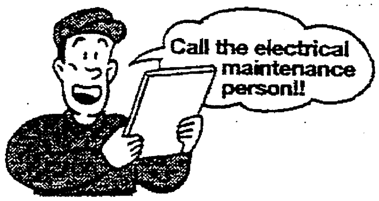
4 When you wish to change the values which have been set for the current of the thermal relay or other set values in the power control panel, please consult with this company.


Do not freely change the set values!

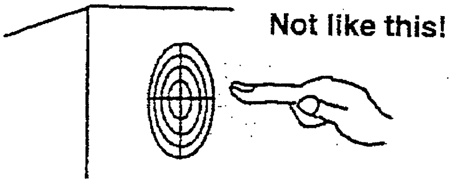
5 Connectors of canon plugs, flexible tubes, and tough rubber-sheathed cables should be relaxed, but should not be forced to bend.


Not like this!

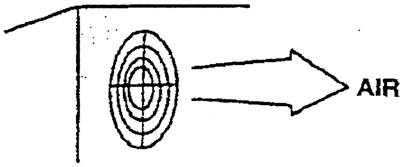
6 Maintenance of electrical equipment, including the primary wiring, should be carried out by the person responsible for such work, or by another person who is qualified to carry out the work safely.


Call the electrical maintenance person!!

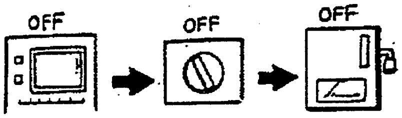
7 Do not insert your finger or any other object into the finger guard while the fan is rotating.


Not like this!

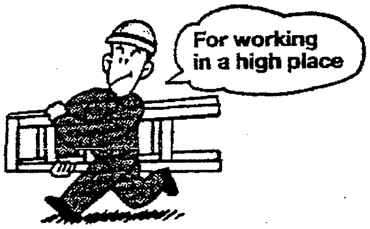
8 Check to make sure that the fan motor starts rotating when the power is turned on.



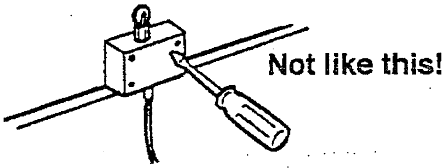
9 When carrying out maintenance and inspection of electrical equipment, the power should always be turned off first, following the procedures described later in this manual. The main power supply should then be turned off by turning off the factory power supply breaker. Check to make sure no voltage is applied to the equipment before starting work.



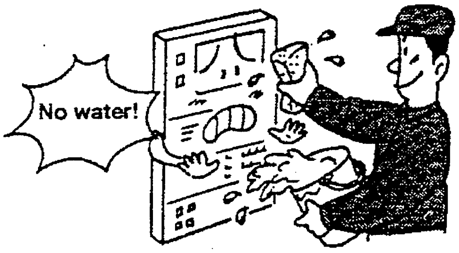
10 When working in a high place, use a ladder or a stand that meets safety requirements, and always wear a helmet.


For working in a high place

11 Never remove or modify limit switches for overtravel or for safety interlock, proximity switches, or any other parts related to these.

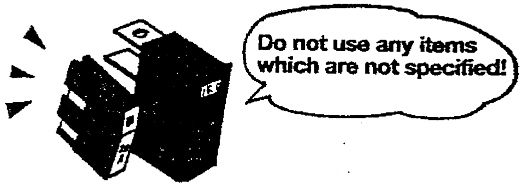

Not like this!

12 Handle all electrical components of the main unit with care, to prevent shorts and broken or disconnected wires. Always keep the equipment dry.

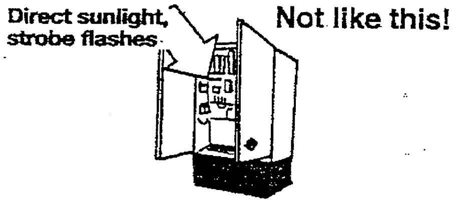


PRECAUTIONS REGARDING SAFETY

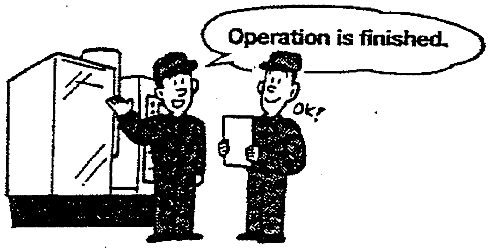
13 Always use the electrical components that are specified by this company. This applies especially to fuses. Never use fuses that exceed the rated capacity, and avoid using copper wire.


Do not use any items which are not specified!

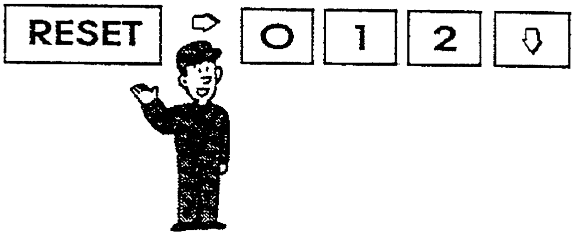
14 Always keep the door of the NC unit closed to avoid exposing the interior to direct sunlight or strobe flashes from cameras. If the door is left open, there is a danger that the ROM memory could be lost.



15 Results of operations should always be double-checked by a person responsible for maintenance.



16 Before searching for a program No. (O number), always press the RESET key.



5. HAZARD WARNING LABELS

Warning labels are affixed to the this machining center in order to promote safe operation.

- Warnings and precautions are also included throughout this instruction manual.
- The meanings of keywords used in this manual to indicate the extent of danger to persons or to the machine are outlined below. These are based on the definitions of the American National Standards Institute (ANSI).
- Operators should become thoroughly familiar with these keywords in order to minimize operator injuries and damage to the machine.

KEYWORDS OF WARNING LABELS

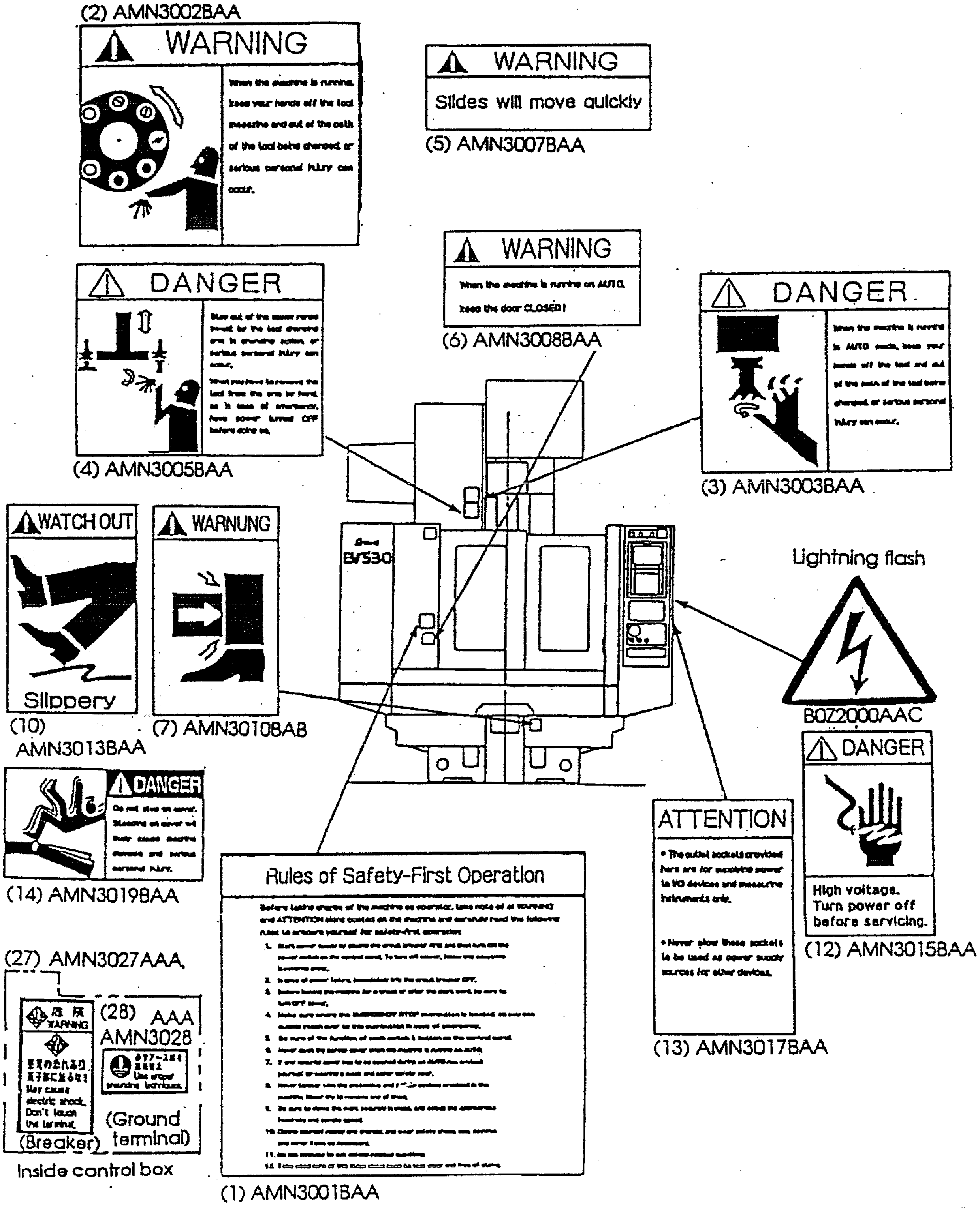
DANGER:	Danger notes indicate any condition or practice which, if not strictly observed, involve a high risk of serious personal injury or even death.
WARNING:	Warning notes indicate any condition or practice which, if not strictly observed, could result in serious personal injury or death.
CAUTION:	Caution notes indicate any condition or practice which, if not strictly observed or remedied, could result in light personal injury or damage to the equipment. Dangerous conditions related only to possible damage to the machinery and countermeasures for preventing them are explained in these caution notes.

OTHER CAUTION LABELS

NOTE:	Notes indicate precautions related to work efficiency or economical operation. They are used for areas or subjects which involve no risk to persons or to the machine.
💡	Display of useful information
☞	Display of reference items, especially places where caution should be observed.

- Warning labels should always be kept clean and should never be removed.
- If a warning label becomes scratched or damaged so that the words are unreadable, it needs to be replaced with a new label.
- Warning labels are available in Japanese, English, and German. Use whichever labels will be understood by the persons who will be operating the machinery.
- In addition to warning labels, precaution items using the keywords defined above are included in this instruction manual. Make sure to observe these warnings and precautions.

LOCATIONS FOR WARNING LABELS AFFIXED TO THIS MACHINE



(2) AMN3002BAA

WARNING

When the machine is running, keep your hands off the tool magazine and out of the path of the tool being changed, or serious personal injury can occur.

WARNING

Slides will move quickly

(5) AMN3007BAA

WARNING

When the machine is running on AUTO, keep the door CLOSED!

(6) AMN3008BAA

DANGER

Stay out of the space range swept by the tool changing arm in changing action, or serious personal injury can occur.

When you have to remove the tool from the arm by hand, as in case of emergency, have power turned OFF before doing so.

(4) AMN3005BAA

DANGER

When the machine is running in AUTO mode, keep your hands off the tool and out of the path of the tool being changed, or serious personal injury can occur.

(3) AMN3003BAA

WATCH OUT

Slippery

(10) AMN3013BAA

WARNUNG

(7) AMN3010BAB

Lightning flash

B0Z2000AAC

DANGER

Do not step on cover. Stepping on cover will [illegible] cause machine damage and serious personal injury.

(14) AMN3019BAA

ATTENTION

- The outlet sockets provided here are for supplying power to I/O devices and measuring instruments only.
- Never allow these sockets to be used as power supply sources for other devices.

(13) AMN3017BAA

DANGER

High voltage.
Turn power off
before servicing.

(12) AMN3015BAA

Rules of Safety-First Operation

(1) AMN3001BAA

(27) AMN3027AAA

WARNING

May cause electric shock. Don't touch the terminal.

(Breaker)

(28) AMN3028AAA

Use proper grounding techniques.

(Ground terminal)

Inside control box

WARNING LABEL PART NO., PLACEMENT LOCATION, AND MEANING

No. Part No.	Placement location & meaning
(1) AMN3001BAA	Near operation panel (general cautions)
(2) AMN3002BAA	Near magazine (precautions for magazine operation)
(3) AMN3003BAA	Spindle head (cutting hazard)
(4) AMN3005BAA	Near ATC arm (cautions for ATC operation)
(5) AMN3007BAA	Near moving sections (hazard from moving parts)
(6) AMN3008BAA	Affix to door (cautions for opening/closing doors)
(7) AMN3010BAB	Low moving sections (hazard near feet or legs)
(10) AMN3013BAA	Coolant tank etc. (cautions to avoid slipping)
(12) AMN3015BAA	Near power switches (high voltage hazard)
(13) AMN3017BAA	Near power outlets (cautions per application)
(14) AMN3019BAA	Near covers (Prohibition of getting on covers)
(27) AMN3027AAA	Inside control box (electrical shock hazards)
(28) AMN3028AAA	Inside control box (electrical shock hazards)
Lightning flash B0Z2000AAC	Power supply (high voltage is present)

NOTE

- ☐ **Use the above part numbers when ordering replacement warning labels.**

1 SPECIFICATIONS AND RELATED DIMENSIONS

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    2. Control Device Specifications 41
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      Option Specifications 46
    3. Standard Accessories 48
    4. Special Accessories 49
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    4. T Slots in Table 53
    5. Spindle Nose Dimensions 54
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    11. Spindle Output Characteristic 62

1-1 SPECIFICATIONS

1. MACHINE SPECIFICATIONS

Item	Description
A-0 Travel Amount	
A-1 X axis (longitudinal stroke, table)	820mm (32.3 inch)
A-2 Y axis (transverse stroke, saddle)	530mm (20.9 inch)
A-3 Z axis (vertical stroke, spindle head)	510mm (20.1 inch)
A-4 Distance from table top to spindle nose	200-710mm (7.9 inch - 28.0 inch)
B-0 Table	
B-1 Table size for work area	1100 mm x 550 mm (43.3 inch x 21.7 inch)
B-2 Maximum allowable weight of work	1000kg (2205 lbs)
B-3 Shape of table top surface	18mm (0.7 inch) T-slots x 5
C-0 Spindle	
C-1 Spindle speeds	20-6000min^{-1}
C-2 Spindle nose taper	7/24 Taper No. 50
C-3 Spindle bearing diameter	110mm(4.3 inch)
D-0 Feedrate	
D-1 Rapid feedrate	32000mm/min
D-2 Cutting feedrate	1 thru 15000mm/min. (0.04 thru 590.6 in/min.)
D-3 Jog feedrate	0-4000mm/min (0-157.5 inch/min)

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	Description
E-0 Automatic Tool Changer	
E-1 Tool shank type	MAS BT50
E-2 Pull stud type	MAS P50T-Ⅱ (60°)
E-3 Magazine tool capacity	20 tools
E-4 Maximum tool diameter	125mm (4.9 inch) (with adjacent tool) 200mm (7.9 inch) (without adjacent tool)
E-5 Maximum tool length	350mm (13.8 inch)
E-6 Maximum tool weight	20kg (44 lbs)
E-7 Tool selection method	Shortcut random
E-8 Tool exchange time (tool-to-tool)	2.0 sec.
E-9 Tool exchange time (chip-to-chip)	4.5 sec.

F-0 Automatic Pallet Changer	
F-1 Number of pallets used	
F-2 Pallet exchange method	
F-3 Pallet exchange time	

G-0 Drive Motors	
G-1 Spindle drive motor	AC 22kW (40%ED)/18.5 kW (continuous)
G-2 Axis feed motors	X, Y: AC 2.9kW Z : AC4.4kW
G-3 Hydraulic pump motor	2.2kW
G-4 Cutting fluid motor	0.25kW (Spindle) 0.4kW (Bed wash)
G-5 Spindle coolant pump motor	0.4kW x 2

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	Description
H-0 Main Power Sources	
H-1 Power supply	200VAC±10%, 50/60Hz±2%, 58.2kVA 220VAC±10%, 60Hz±2%, 58.2kVA
H-2 Air pressure supply	0.4-0.8MPa(4-8kgf/cm^2) 450L/min(atmospheric)
I-0 Tank Capacity	
I-1 Hydraulic unit tank capacity	10L (2.6 gal)
I-2 Spindle coolant tank capacity	20L (5.2 gal) (Head interior)
I-3 Cutting fluid tank capacity	200L (53.0 gal)
J-0 Machine Dimensions	
J-1 Height	2860mm (112.6 inch)
J-2 Floor space occupied	2370mm x 2650mm (93.3 inch x 104.3 inch)
J-3 Machine weight (incl. NC device)	7000 kg (15432 lbs)
J-4 Distance from floor to table top	950mm (37.4 inch)

2. CONTROL DEVICE SPECIFICATIONS

BASIC SPECIFICATIONS

Item	ENAC (J100/J300)
A-0 Controlled Axis	
A-1 Controlled axis	3 axes: X, Y, and Z axes
A-2 Simultaneous controllable axes	3 axes (for linear interpolation positioning) 2 axes (for circular interpolation)
B-0 Input Commands	
B-1 Least input increment	0.001mm (0.0001 inch)
B-2 Least output increment	0.001mm (0.0001 inch)
B-3 Max. command value	±999999.999mm (±9999.9999 inch)
B-4 Absolute/incremental commands	G90/G91
B-5 Decimal point input	Data with decimal point can be input.
B-6 Tape code	EIA RS-244/ISO840 Auto-recognition
B-7 Tape format	Word address format
C-0 Interpolation	
C-1 Positioning	G00, G06
C-2 Linear interpolation	G01
C-3 Circular interpolation	G02-G03 (Multi-quadrant circular interpolation)
D-0 Feed Function	
D-1 Feedrate	F5-digit mm/min direct command
D-2 Dwell	G04 (max. 999999.999 sec)
D-3 Manual handle feed	1 unit: 0.001/0.01/0.1mm (0.0001/0.001/0.01inch)(per scale marking)
D-4 Automatic acceleration/deceleration	Rapid feed: "S" shaped acceleration/deceleration Cutting feed: exponential acceleration/deceleration

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	ENAC (J100/J300)
D-5 Rapid feed override	Parameter, 25/50/100%
D-6 Feedrate override	0-200% (at 10% intervals)
D-7 Manual continuous feed	
D-8 High speed, high precision machining I	GDC I
E-0 Program Memory and Editing	
E-1 Program memory capacity	Accommodates 320m tape length memory (using 90m tape memory as basic control)
E-2 Program memory and editing	
E-3 No. of programs	99 pcs. (25 used for basic control)
E-4 Program number search	
E-5 Sequence number search	
E-6 Address search	Search of all address data in memory
E-7 Program number/sequence number	O: 5 digits/N: 5 digits
E-8 Background editing	
E-9 Program comment	
E-10 Expansion editing of program	
F-0 Operation and Display	
F-1 Operation panel: display section operation section	9-inch LCD vertical type monochrome display Flat keyboard (w/soft key)
F-2 Display functions	Programs, current position, command values, compensatory values, parameters, message display, operation time, others
F-3 MDI functions	MDI operation, available with B function
F-4 Display language selection	English
F-5 Data protection key	1 pcs.
F-6 Operation time display	Accumulated total time display: time that power is on, auto run time, other
F-7 Calendar display	Display of date and time
F-8 Buzzer function	
F-9 Ladder diagram display	

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	ENAC (J100/J300)
G-0 Input/Output Function	
G-1 Input/output interface	RS-232C x 1 port
G-2 External power on/off	
H-0 STM Functions	
H-1 Spindle functions (S function)	S 4-digit or 5-digit direct command
H-2 Tool functions (T function)	T 4-digit direct command
H-3 Miscellaneous function (M function)	M 3-digit
I-0 Tool Compensation	
I-1 Tool length compensation	G43, G44, G49
I-2 Tool compensation memory capacity	299 units, H/D shared method
I-3 Tool diameter compensation C	G40, G41, G42
1-4 Tool position offset	G45, G46, G47, G48
J-0 Coordinate System	
J-1 Manual return to reference point	
J-2 Automatic return to reference point	G28
J-3 Reference point return check	G27
J-4 Return from reference point	G29
J-5 Return to second reference point	G30
J-6 Automatic coordinate system setup	
J-7 Base coordinate system setup	G92
J-8 Work coordinate system setup	6 types of workpiece coordinates systems can be set with commands G54-G59.
J-9 Local coordinate system setup	G52
J-10 Machine coordinate system setup	G53

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	ENAC (J100/J300)
K-0 Operation Support Functions	
K-1 Cycle start/feed hold	
K-2 Label skip	
K-3 Control in/out	Data in "(" ")" are ignored
K-4 Single block	
K-5 Optional stop	M01
K-6 Optional block skip	1 set
K-7 Dry run	
K-8 Mirror image	M94, M95 fixed
K-9 Z-axis command cancel	
K-10 Auxiliary function lock	
K-11 Machine lock	
K-12 Program stop/program end	M00, M02, M30
K-13 Reset	
K-14 Manual absolute on/off	Optional external switch, normally on
K-15 Follow-up	
L-0 Program Support Functions	
L-1 Circular arc radius R specification	
L-2 Canned cycle	G73, G74, G76, G77, G80-G89
L-3 Solid tap	G93, G94
L-4 Circle cutting	G12, G13
L-5 Subprogram	Can be nested up to 4 levels.
L-6 Scaling	G50, G51 expansion, contraction
L-7 Exact stop	G09
L-8 Exact stop mode	G61
L-9 Exact stop mode cancel	G64
L-10 Programmable data input	G10
L-11 Hole machining pattern cycle	G70, G71, G72

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	ENAC (J100/J300)
L-12 Program copy	G25
L-13 Macro program	G65, G66, G67: 700 sets of common variables, of which 100 sets have been assigned for basic function, and 200 sets, if options included.
M-0 Accuracy Compensation for Mechanical System	
M-1 Backlash compensation	
M-2 Stored pitch error compensation	
M-3 Unidirectional approach	G60
N-0 Machine Support Function	
N-1 Each axis interlock	
O-0 Automatic Operation Support Function	
o-1 Skip function	G31
P-0 Safety and Maintenance	
P-1 Emergency stop	
P-2 Overtravel	
P-3 Stored stroke limit 1	First ~ 5th prohibited areas
P-4 Self diagnosis function	
P-5 Follow up	
Q-0 Enclosures and Installation Requirements	
Q-1 Enclosures structure	Airtight, dustproof construction
Q-2 Power required	AC200V+10% to -15% 50/60 Hz ± 1 Hz AC220V+10% to -15% 50/60 Hz ± 1 Hz
Q-3 Environmental conditions	Ambient temp.: 5°C to +35°C Relative humidity: 10% to 75% (RH) Vibration: 0.5G max.

OPTION SPECIFICATIONS

Item	ENAC (J100/J300)
a-0 Controlled Axes	
a-1 Controllable axis expansion function: 4th axis, 5th axis	Additional axis (incl. simultaneous control of 4 axes and 5 axes)
b-0 Input Commands	
b-1 Inch/metric conversion	G20, G21
c-0 Interpolation	
c-1 Helical interpolation	G02, G03
d-0 Feed	
d-1 F 1-digit feed	
e-0 Program Memory and Editing	
e-1 Expansion of program memory capacity	With PC memory card; 32M byte (Max.) (Equivalent to 81280m tape length)
e-2 No. of additional registerable programs	299/999 units (total) (With PC memory card) 2000 units (total) (With PC memory card)
e-3 Playback	
e-4 F · S automatic editing	
f-0 Operation Display	
f-1 NC program drawing	
f-2 NC track drawing	
f-3 Multi-language display	German, French, Italian
g-0 Data Input/Output	
g-1 External data input	
g-2 External part program No. search	Max. 15 programs

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item		ENAC (J100/J300)
g-3	Input/output interface	1 port added
g-4	Program file	EPB-5 (Enshu program bank)
i-0	Tool Compensation	
i-1	Addition of tool compensation number	999/1199 units (total)
i-2	Addition of tool compensation number, H/D separated method	499·499/599·599 units
i-3	Tool length measurement	Manual
j-0	Coordinate Systems	
j-1	Return to third or fourth reference points	G30P3/4
j-2	Additional pairs of workpiece coordinate systems	G54-59 P setting 54 pairs G54-59 P setting 162 pairs
j-3	Workpiece coordinate system rotation	
k-0	Operation Support Functions	
k-1	Optional block skip addition	8 additional pairs
k-2	Program restart	
k-3	Auto mode handle offset	
k-4	External manual absolute on/off	
k-5	Spindle override	50 - 120%
k-6	Manual intervention point return	
l-0	Program Support Functions	
l-1	Canned cycle B	G181 - G189
l-2	Coordinate system rotation	G68, G69
l-3	Automatic corner override	G106
l-4	Corner cutting feedrate designation	G107

1 SPECIFICATIONS AND RELATED DIMENSIONS

Item	ENAC (J100/J300)
m-0 Upgrade in Machine and Machining Precision	
m-1 Optical scale interface	
o-0 Automatic Operation Support Function	
o-1 Tool life control	
o-2 Program interruption	M90, M91
p-0 Safety and Maintenance	
p-1 Stored stroke limit before move	Checks axis travelling limit before movement is performed.

3. STANDARD ACCESSORIES

- Spindle air curtain
- Operation tools
- Level bolts and blocks
- Work light (halogen)
- Spindle coolant
- Total enclosed splashguard
- Cutting fluid device (Scraping type 200 ℓ)
- Bed wash coolant
- Automatic power breaker

4. SPECIAL ACCESSORIES

- Shower gun
- Center through coolant
- Cutting oil device for oil holes
- Chip air blow device (spindle center)
- Chip air blow device (outside of spindle)
- Lift-up chip conveyor (machine outside)
- Chip conveyor (machine inside)
- Automatic device for tool length measurement
- Tool breakage sensor
- Automatic centering device
- Scale feed back
- Sub table
- Total enclosed splashguard with ceiling
- Groundfault circuit breaker
- External control box (cycle start, feed hold, emergency stop)
- Spindle run hour meter
- Work counter
- Automatic programming device
- Signal tower (alarm lamp, work-off lamp)
- Work-off buzzer
- Ethernet function

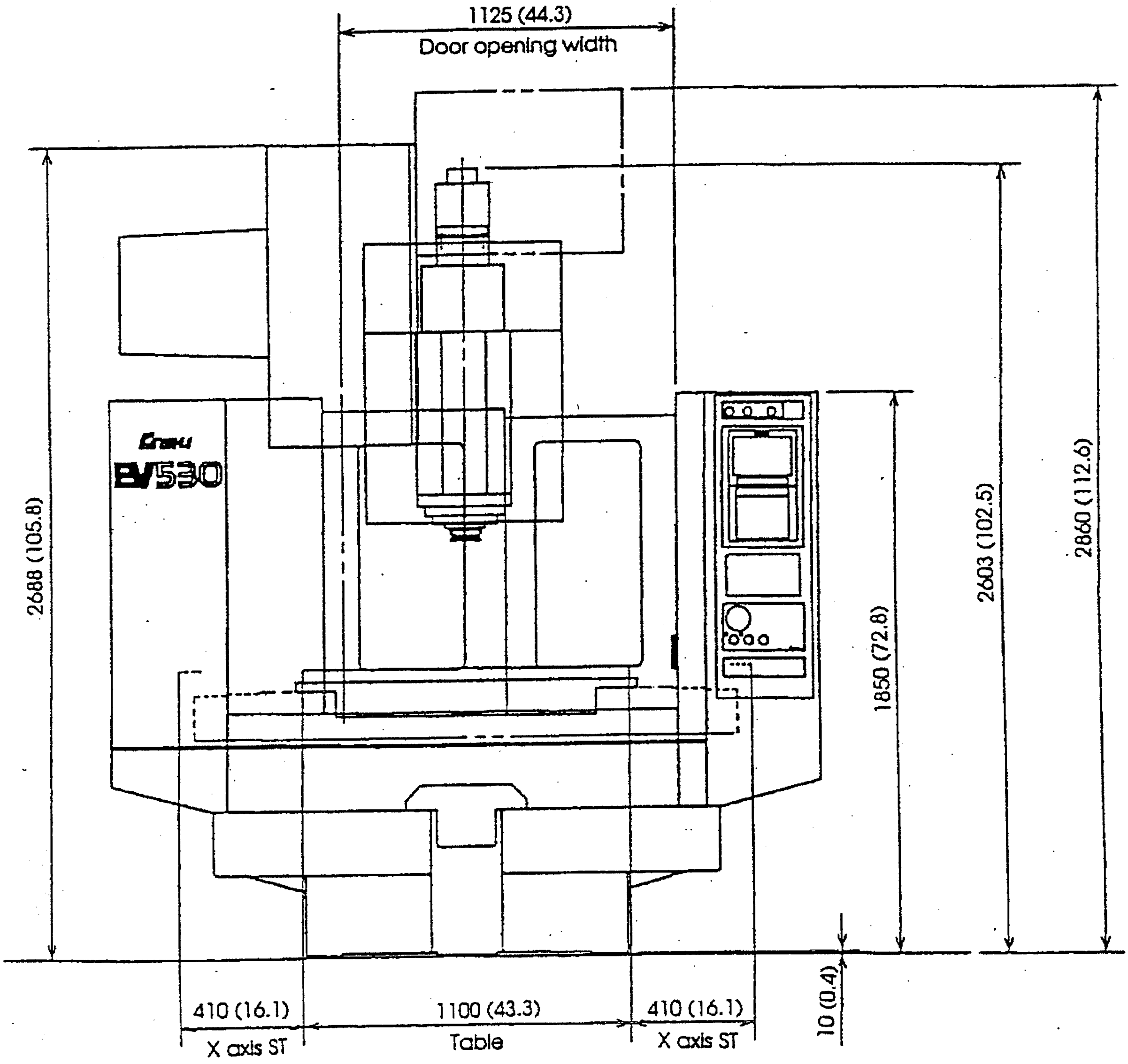
5. SPECIAL SPECIFICATIONS

- ATC 30 tools
- High column; 220mm (8.7 in.) higher than standard
  (Z axis stroke is the same as standard machine.)
- 10000min^{-1} spindle
- Pallet changer (2APC)
- HSK-A100 spindle/big plus spindle
- CE marking

1-2 RELATED DIMENSIONS, BOUNDARIES, AND CHARACTERISTICS

1. PRINCIPAL DIMENSIONS OF MAIN UNIT

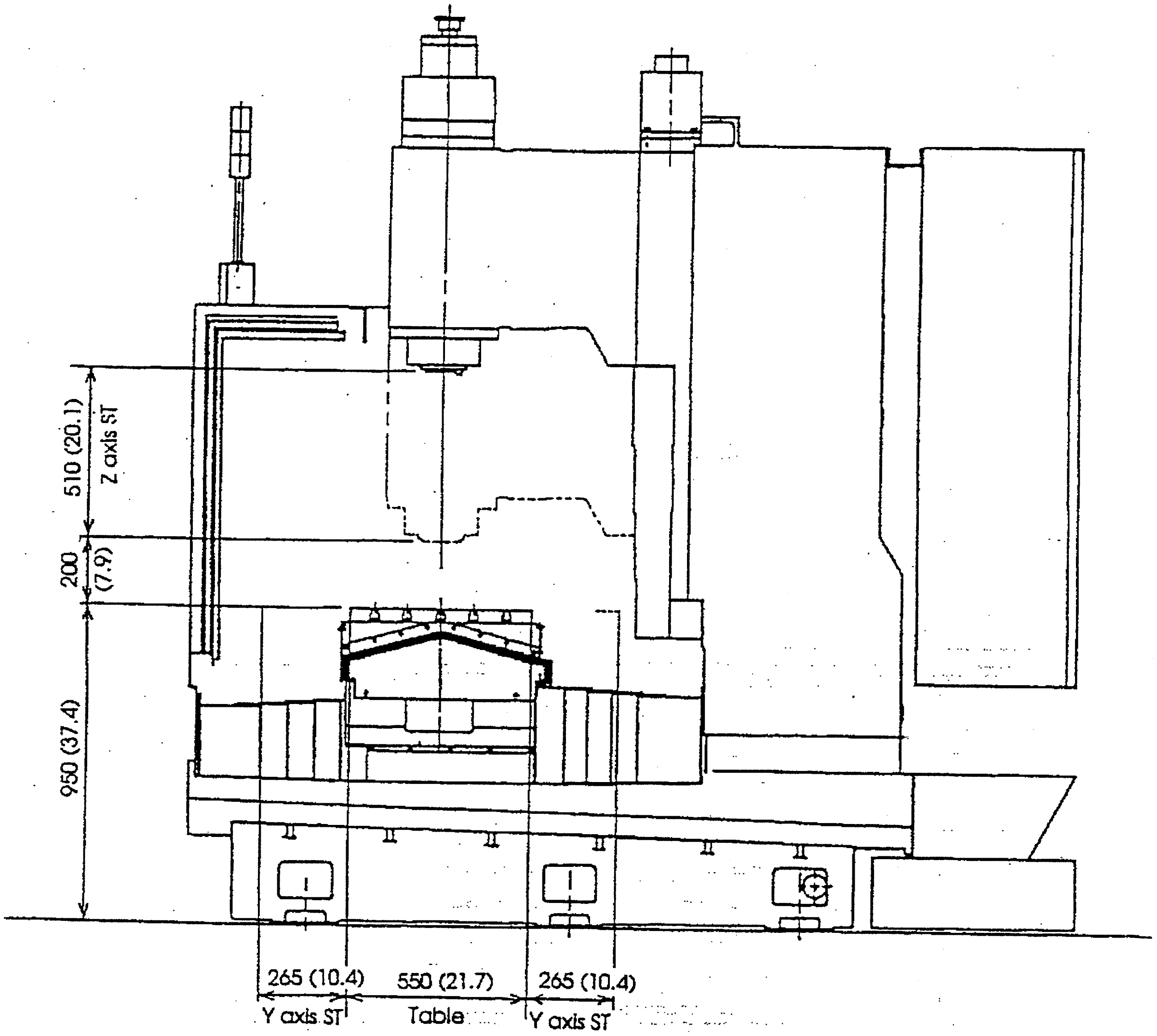
Unit : mm (inch)



View from front

1 SPECIFICATIONS AND RELATED DIMENSIONS

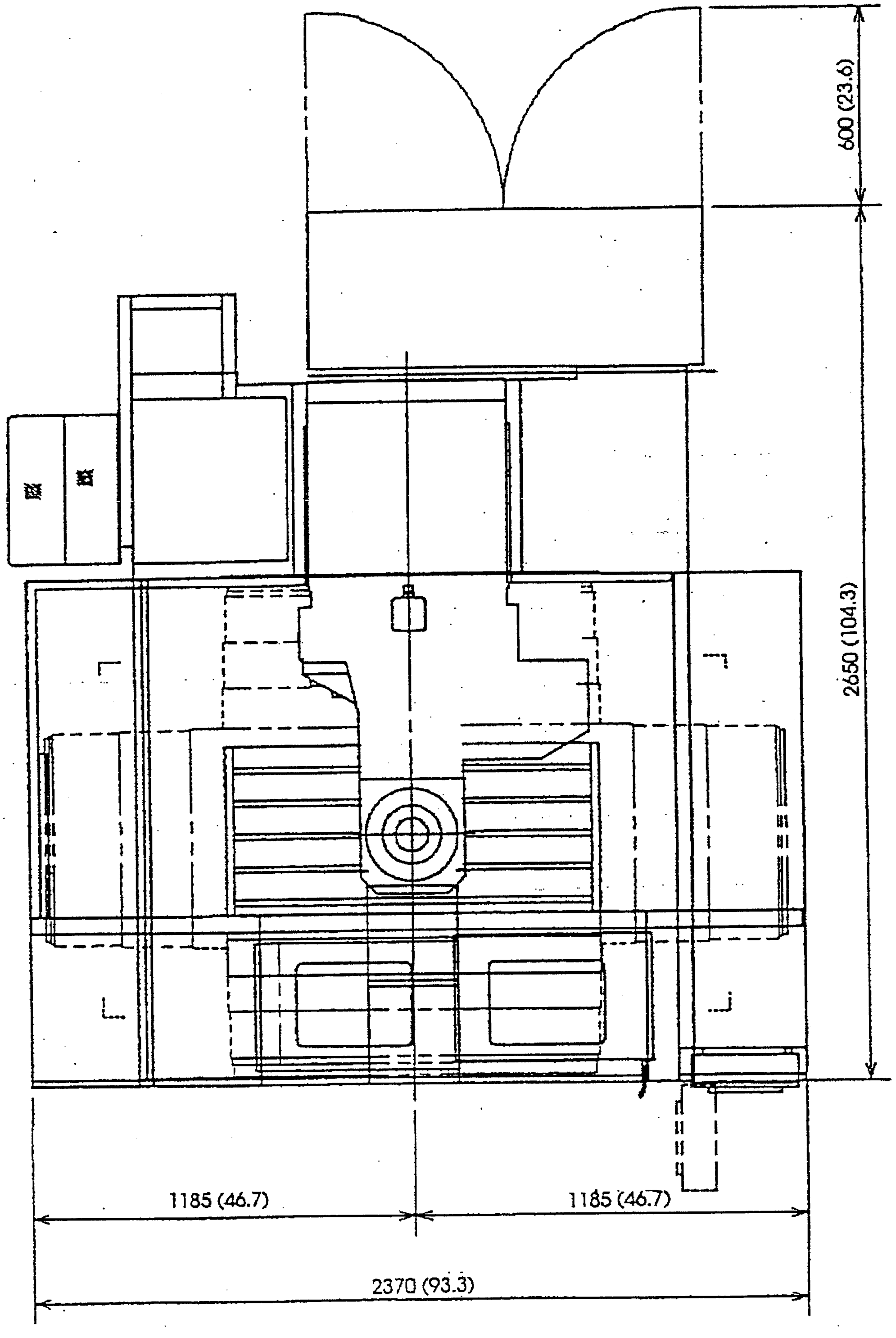
Unit : mm (inch)



View from right side

2. FLOOR SPACE

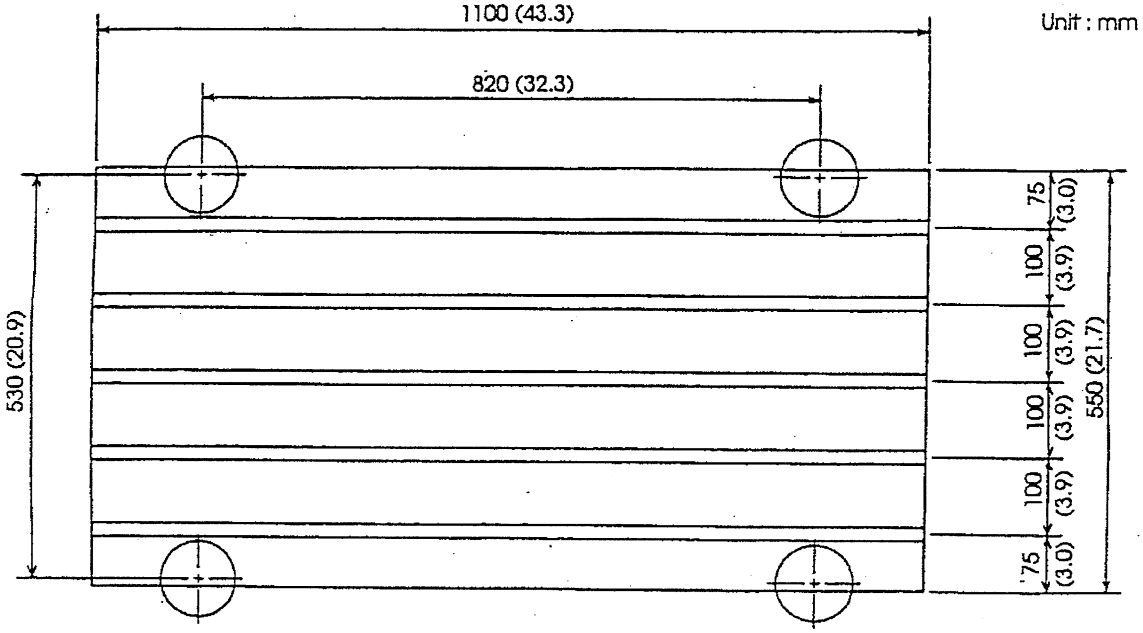
Unit : mm (inch)



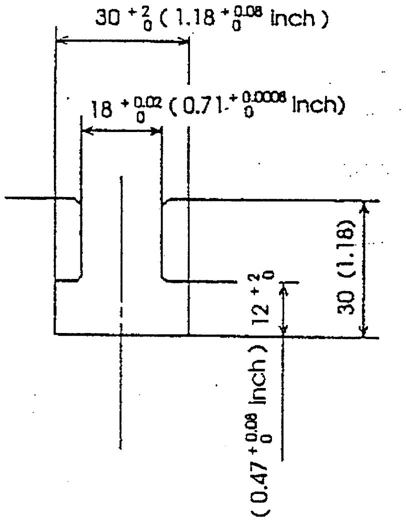
1 SPECIFICATIONS AND RELATED DIMENSIONS

3. TABLE

Unit : mm (inch)

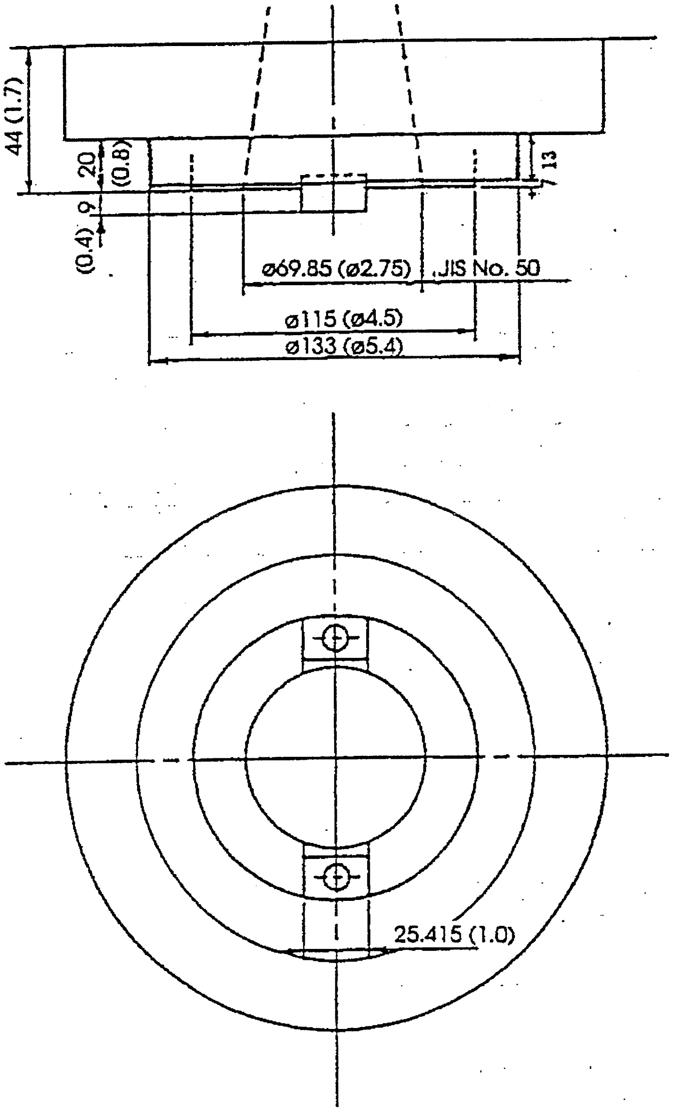


4. T SLOTS IN TABLE

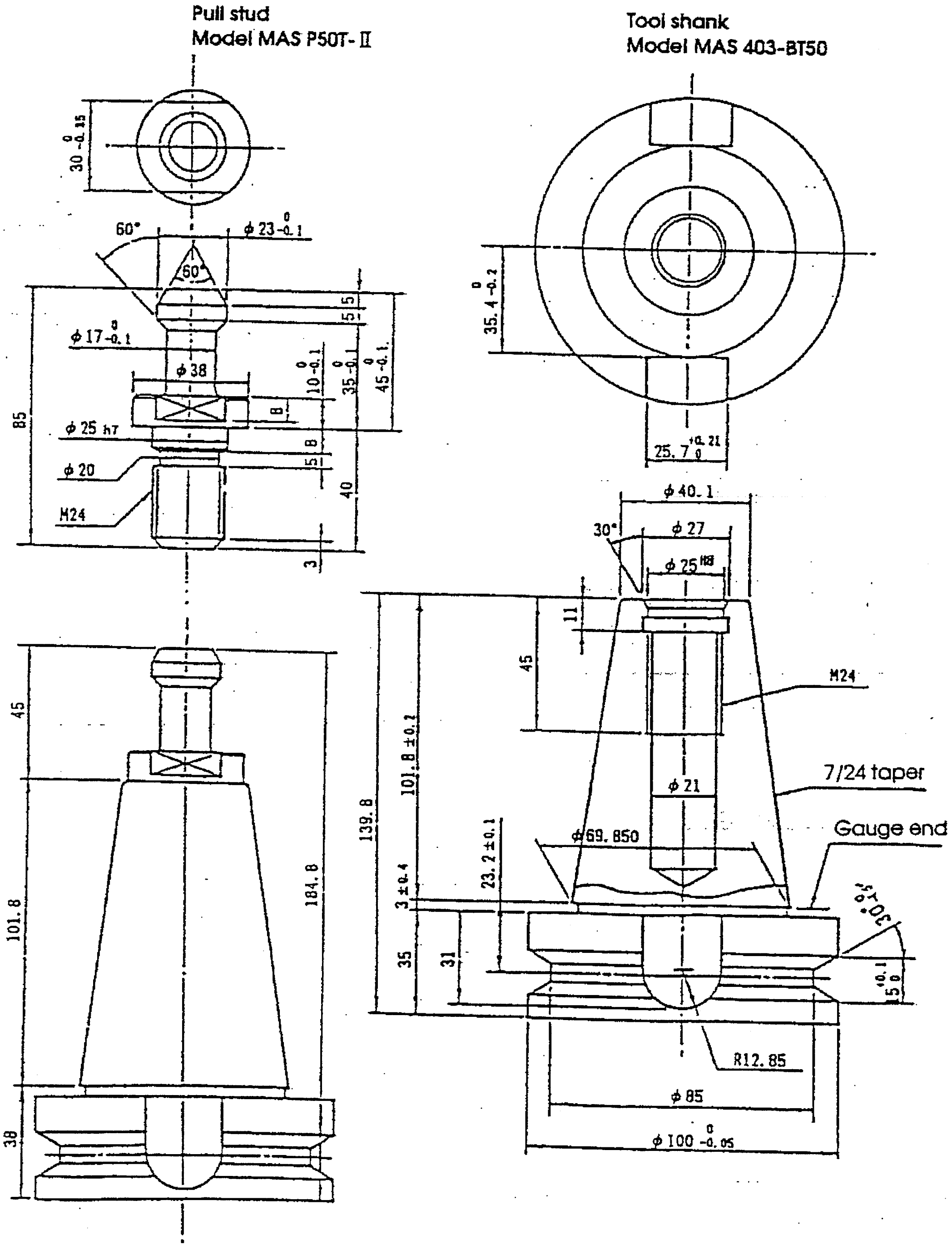

30 +2 0 (1.18 +0.08 0 inch)
18 +0.02 0 (0.71 +0.0008 0 inch)
12 +2 0 (0.47 +0.08 0 inch)
30 (1.18)

5. SPINDLE NOSE DIMENSIONS

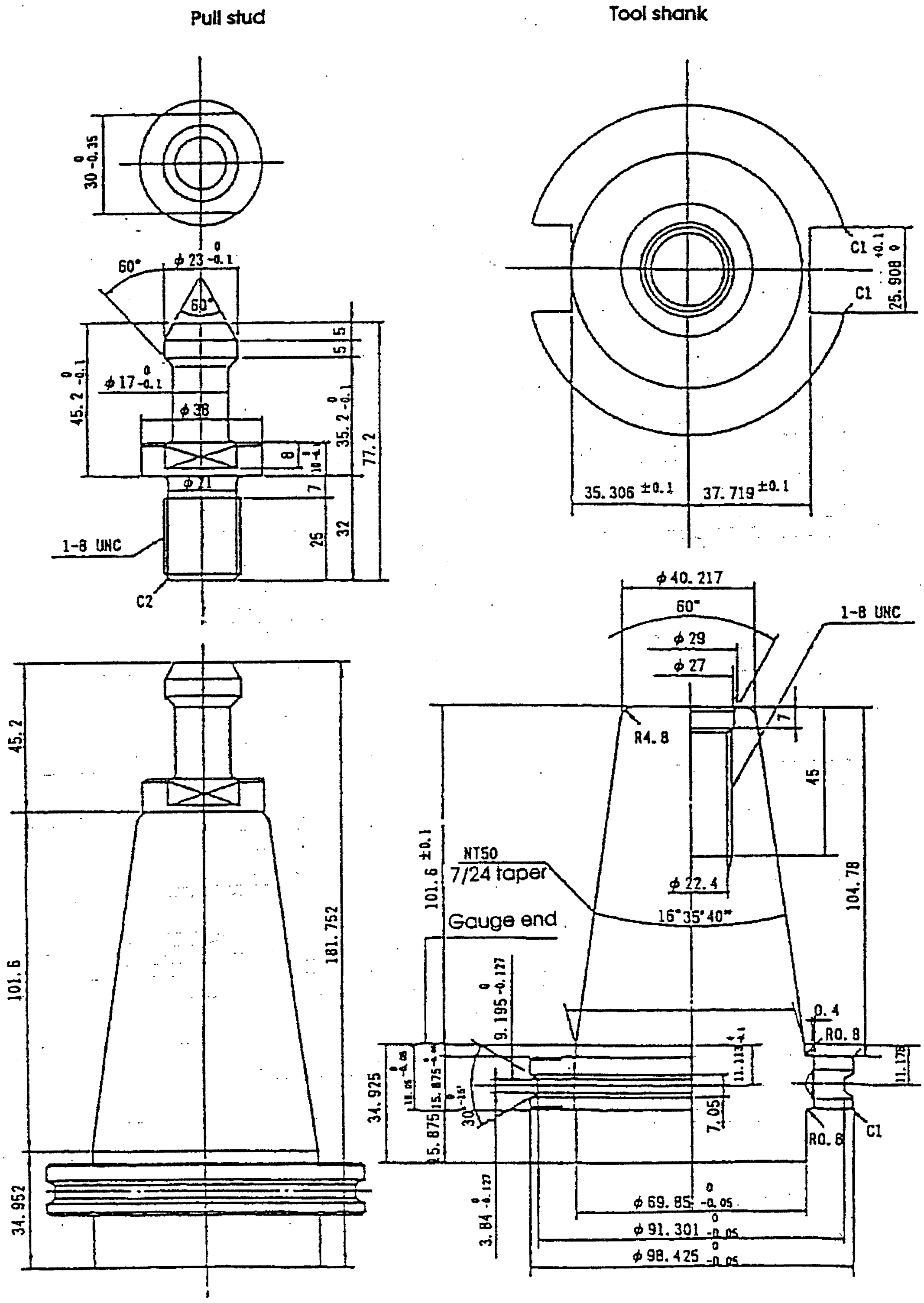
Unit : mm (inch)



6. TOOL SHANK AND PULL STUD

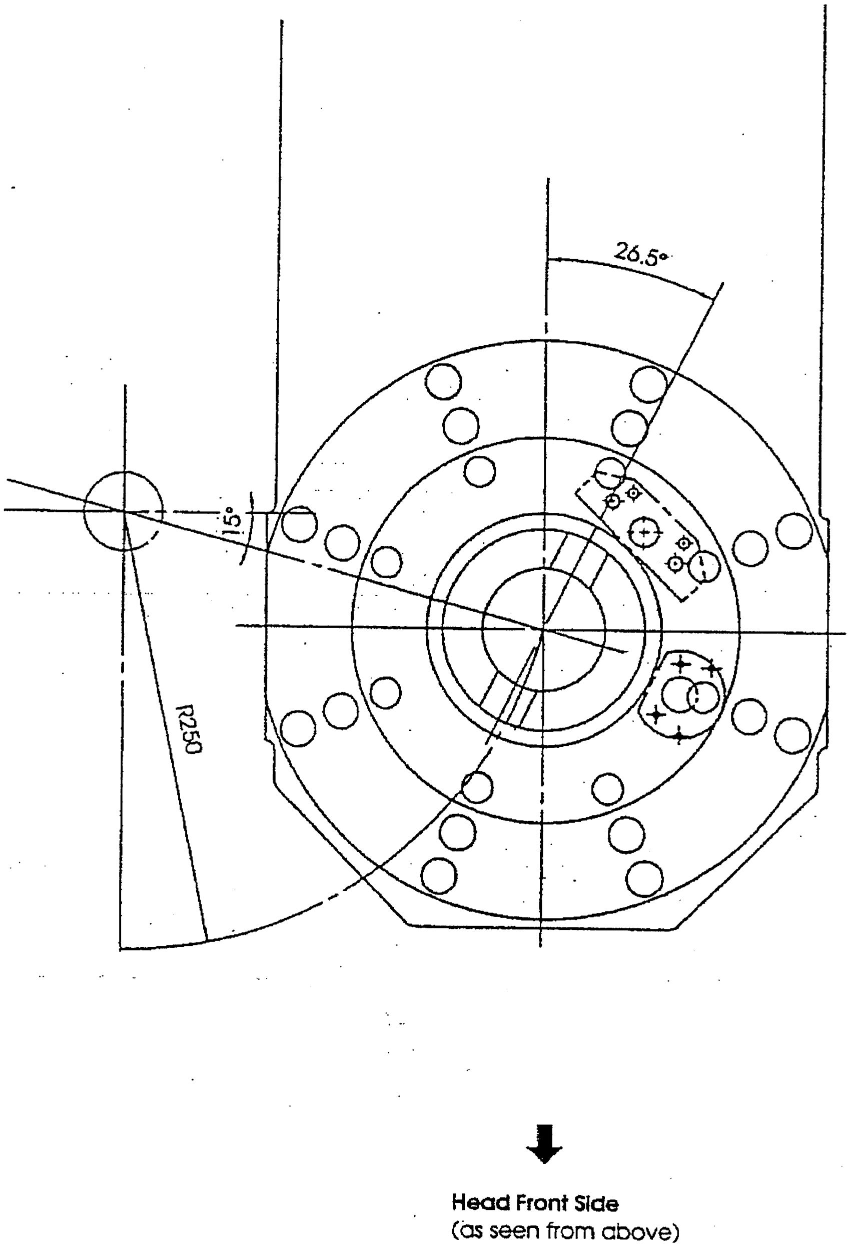


CAT STANDARD TOOL SHANK AND PULL STUD



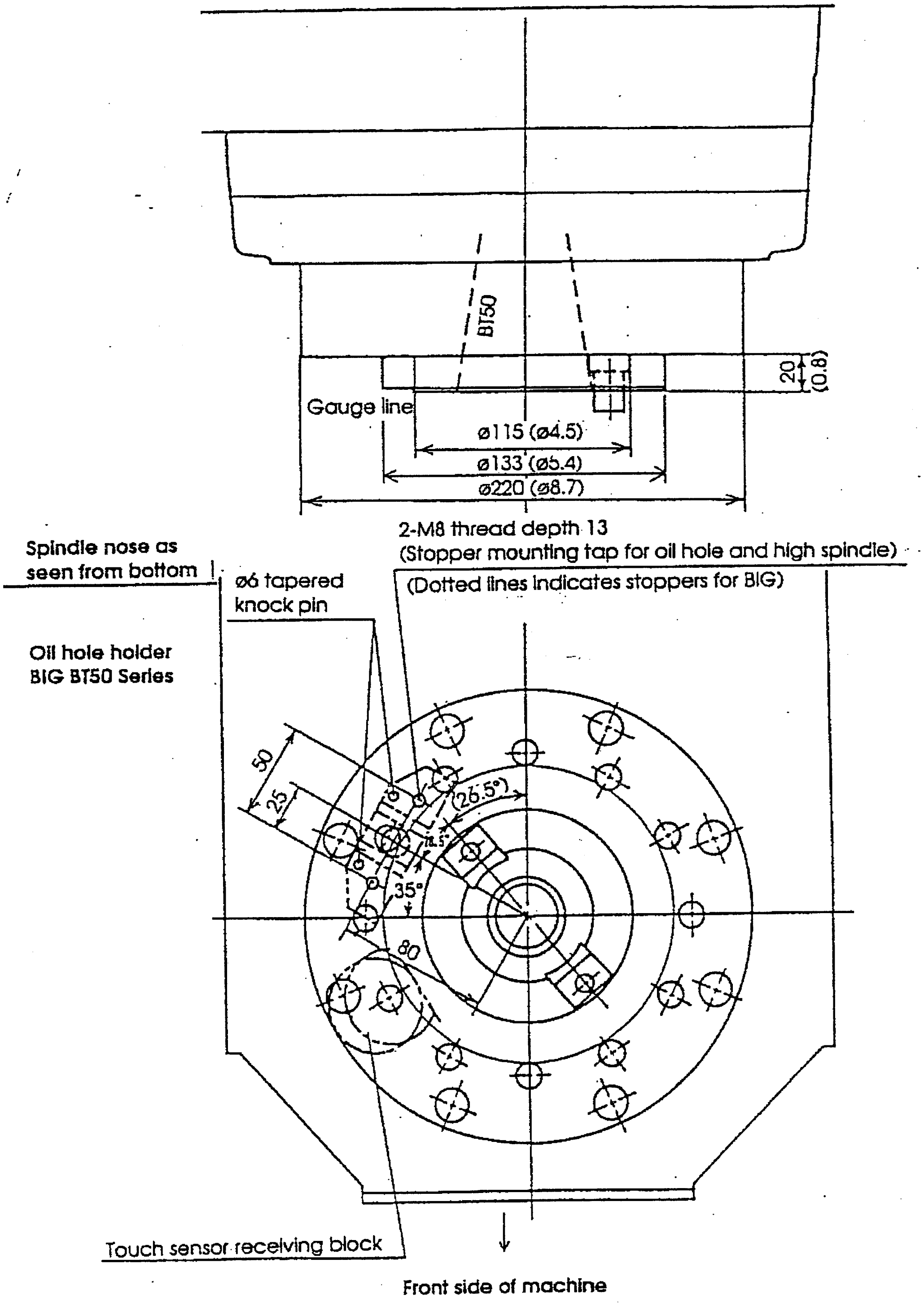
7. ORIENTATION POSITION

Unit : mm (inch)

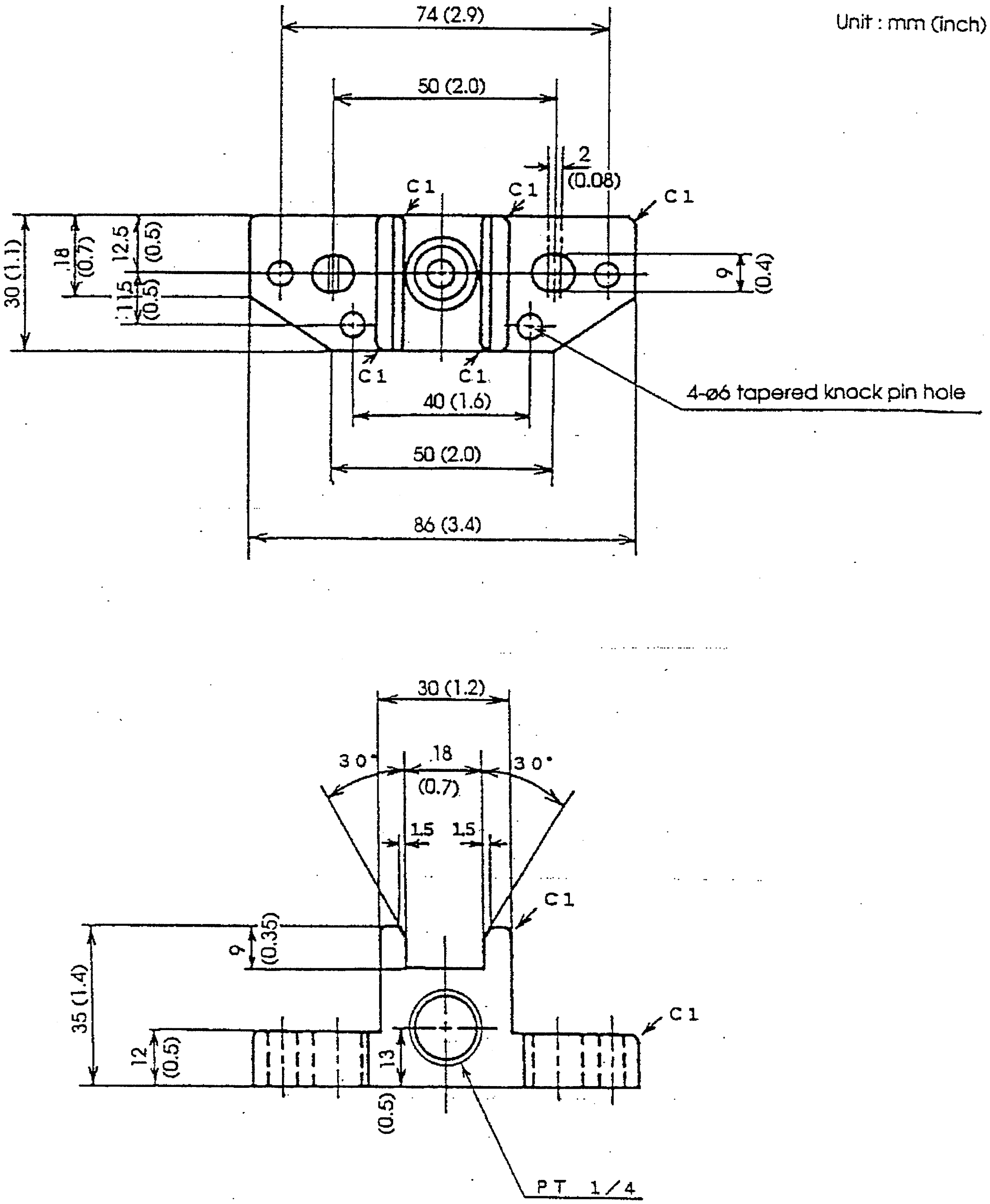


8. OIL HOLE HOLDER MOUNTING DIMENSIONS

Unit : mm (inch)


BT50
20
(0.8)
Gauge line
ø115 (ø4.5)
ø133 (ø5.4)
ø220 (ø8.7)
2-M8 thread depth 13
(Stopper mounting tap for oil hole and high spindle)
(Dotted lines indicates stoppers for BIG)
Spindle nose as seen from bottom
ø6 tapered knock pin
Oil hole holder BIG BT50 Series
50
25
(26.5°)
18.5°
35°
80
Touch sensor receiving block
Front side of machine

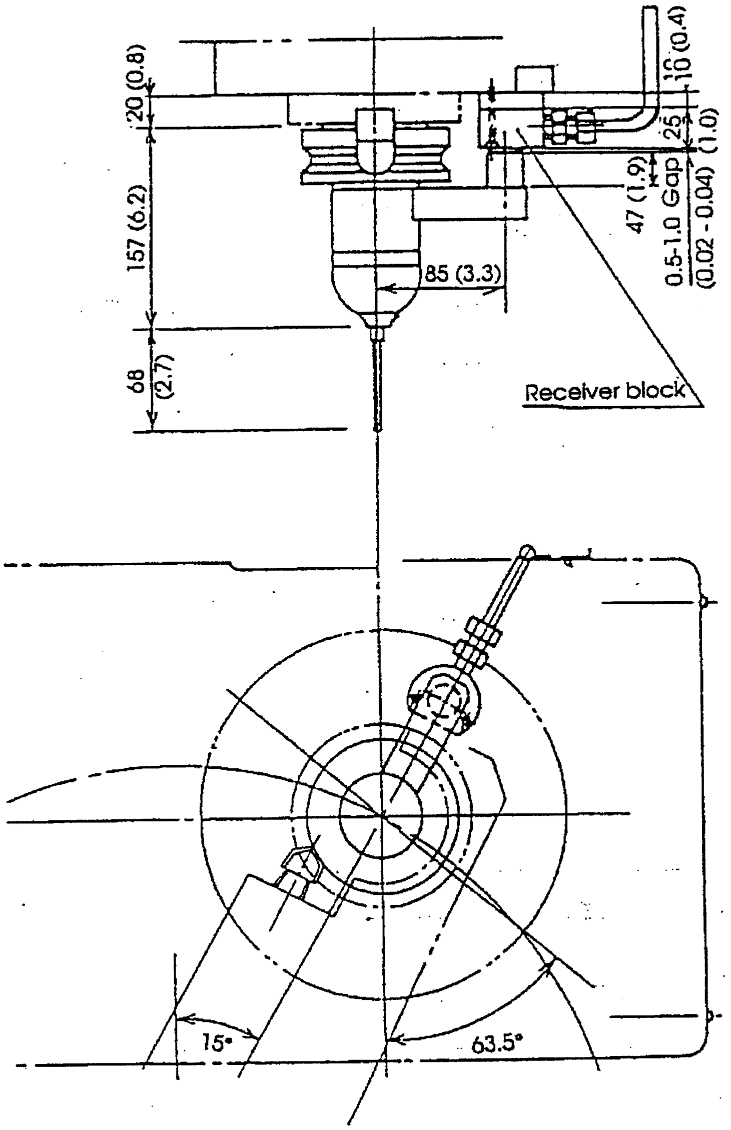
1 SPECIFICATIONS AND RELATED DIMENSIONS



Oil hole holder block dimensions

9. AUTOMATIC CENTERING DEVICE MOUNTING DIMENSIONS

Unit : mm (inch)



10. MAXIMUM TOOL RESTRICTION DIAGRAM AND WEIGHT RESTRICTIONS

(1) Maximum tool diameter .... ø200 x 350 max
(with no adjacent tool)

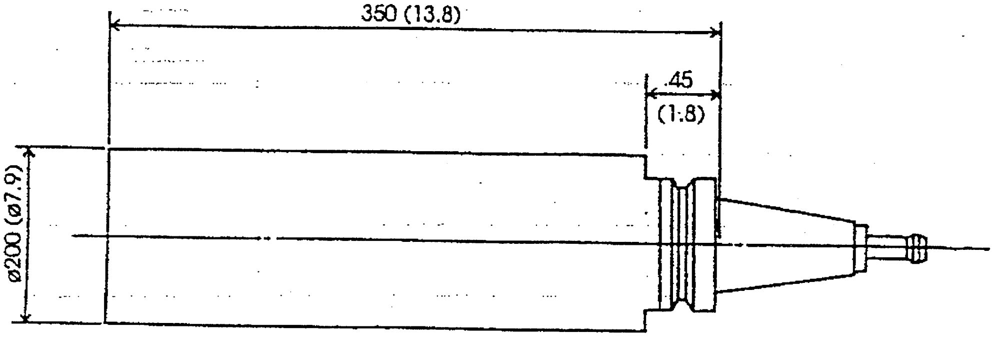
(2) Maximum tool diameter .... ø125 x 350 max
(with adjacent tool)

(3) Maximum tool weight 20kg

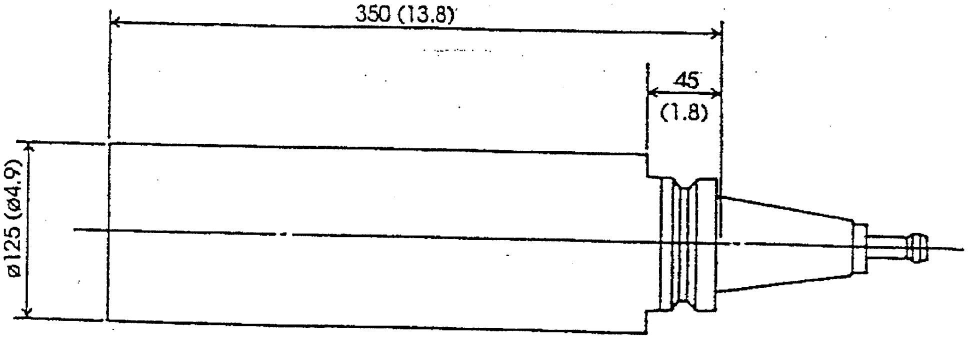
(4) Overall tool weight 200kg

(1) ø200 x 400 max. (without adjacent tool)

Unit : mm (inch)

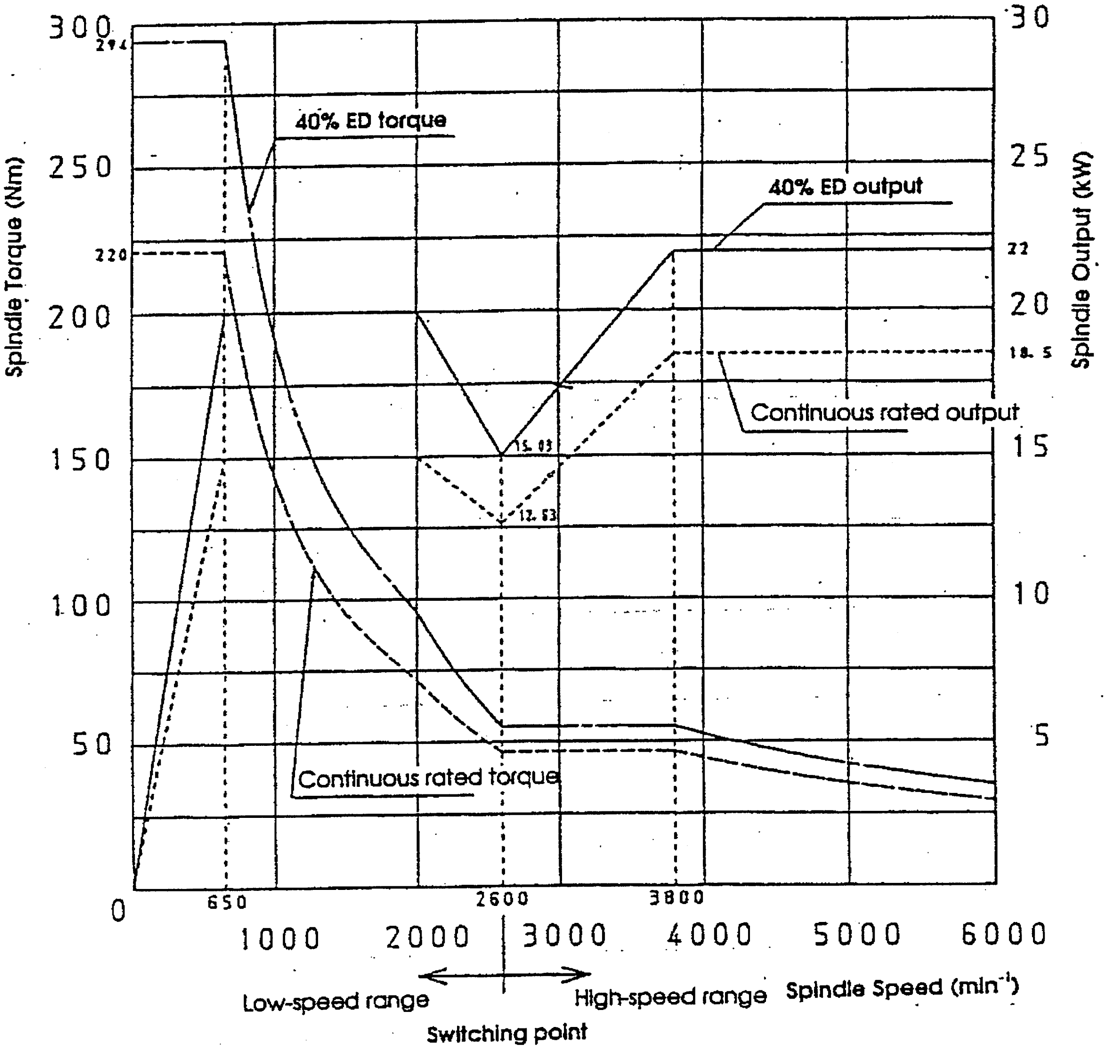


(1) ø125 x 400 max. (with adjacent tool)



11. SPINDLE OUTPUT AND TORQUE DIAGRAM

Spindle Output Characteristic



2 TRANSPORTING AND INSTALLING THE MACHINE

2 Transporting and Installing the Machine 63
2-1 Transporting the Machine 64
1. Moving Operation 64
2. Moving With the Forklift 66
3. Precautions When Moving the Equipment 67
2-2 Preparation Before Installing the Machine 68
1. Environment and Foundation 68
2. Lubrication Oil and Cutting Fluid 72
2-3 Preparation for Operation and Leveling..73
1. Removing the Rustproofing Agent 73
2. Supplying Lubrication Oil and Adding Cutting Fluid 74
3. Removing the Securing Fittings 75
4. Leveling 76
5. Connecting the Power Supply and the Air Source 78
2-4 Precautions When the Additional Axis (ABS Motor) is Removed .. 81
1. Method of Discharge 81
2. NC Operation for Setting Origin 82

2-1 TRANSPORTING THE MACHINE

⚠ **WARNING**

1 When carrying out hoisting operations, make sure all of the precautions that apply to ordinary operations and to safety regulations are carefully observed.

2 When suspending the machining center, overall balance is extremely important. Check to make sure the equipment is carefully balanced and that no unnecessary objects have been left on top of the machine before lifting it.

3 When transporting the main unit, handle the unit and the power control box carefully to avoid shock or impact.

4 The weight of the machining center is 7000kgf. Make sure that the wire ropes are strong enough to support the weight of the machine.

1. MOVING OPERATION

1 Adjust head height and install the securing fittings for the Z axis to secure the head.

2 Secure the control box and the securing fittings for each axis. (Fig. 2-2)

SUSPENDING THE MACHINE

1 To suspend the machine, use wire ropes with an I-beam, like those shown in Fig. 2-1.

2 At the front of the machine, fit the wire ropes over the eye bolts provided at the left and right sides of the bed. Make sure the wire ropes are strong enough to support the weight of the machine. (Maximum machine weight: 7000kg)

3 At the rear of the machine, fit the wire ropes over the center suspension fittings at the rear of the column.

☐ Hoisting procedure is complete.

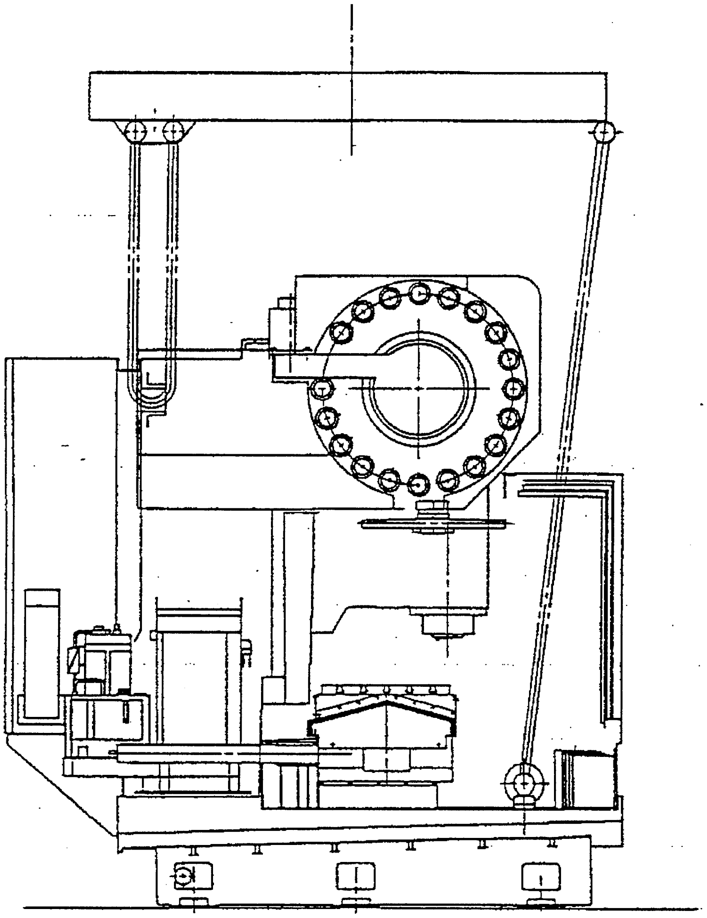


Fig. 2-1

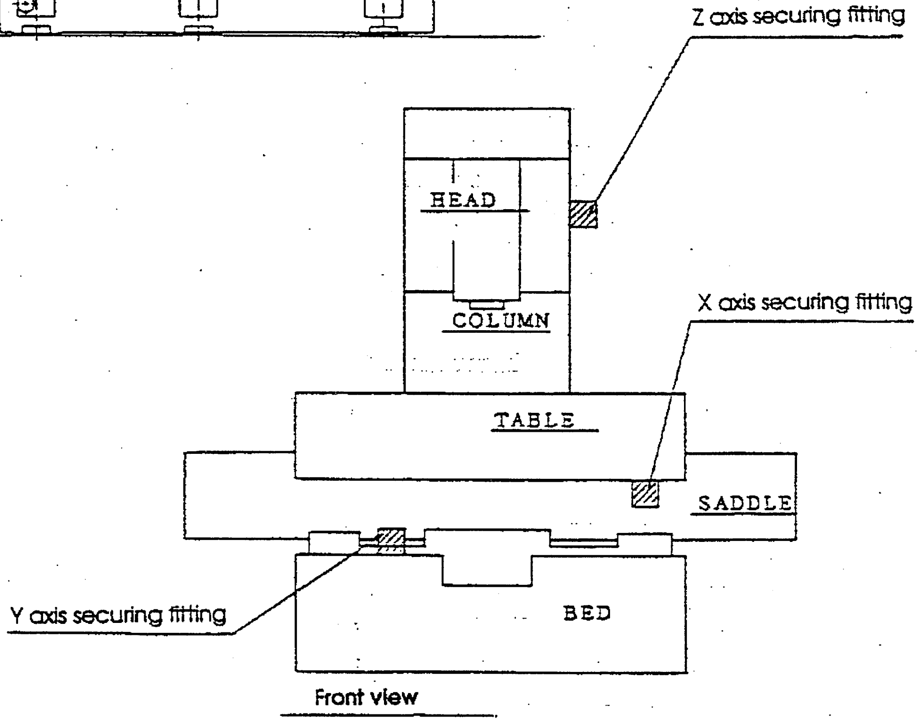


Fig. 2-2 Positions for installing securing filter

2. MOVING WITH THE FORKLIFT

⚠ WARNING

1 When carrying out the forklift operation, make sure all of the precautions that apply to ordinary operations and to safety regulations are carefully observed.

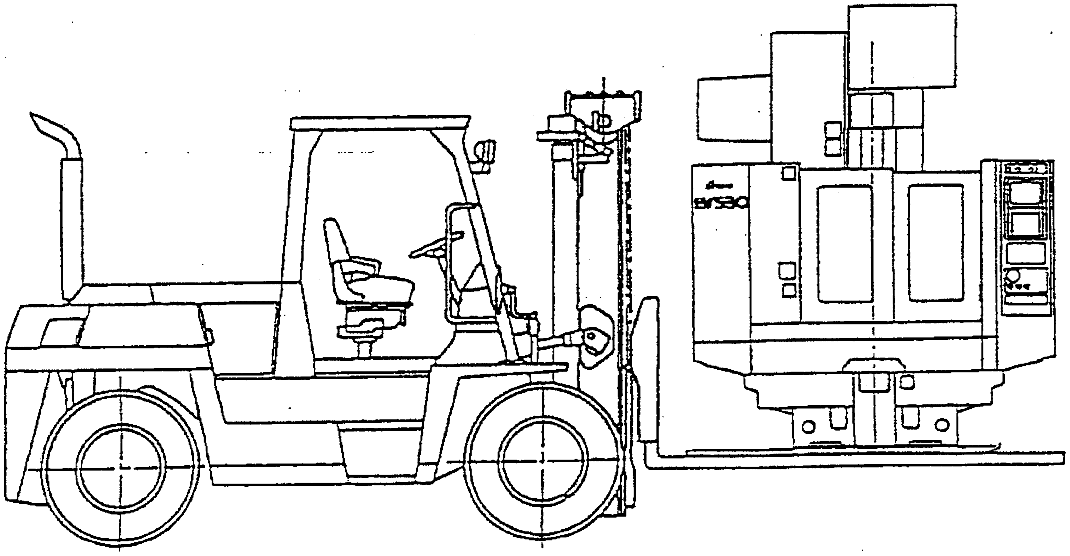
2 When lifting the machining center, overall balance is extremely important. Make sure the equipment is carefully balanced before lifting it. In particular, check the maximum weight that the forklift can carry.

3 When transporting the main unit, make sure nothing has been left on top of the unit. Also, handle the unit and the power control box carefully to avoid shock or impact.

Carry out the following procedures, referring to the diagram below.

1) Secure the X axis, the Y axis, and the head. (See the section on suspending the equipment, on page 64.)

2) As shown in the illustration below, insert the forks from the left side and lift up the machining center. Because of the location in which the machining center is installed, if the forks must be inserted from the right side, make sure that the road surface is level and that the machine is transported only a short distance. Always give careful consideration to the balance of the machining center.

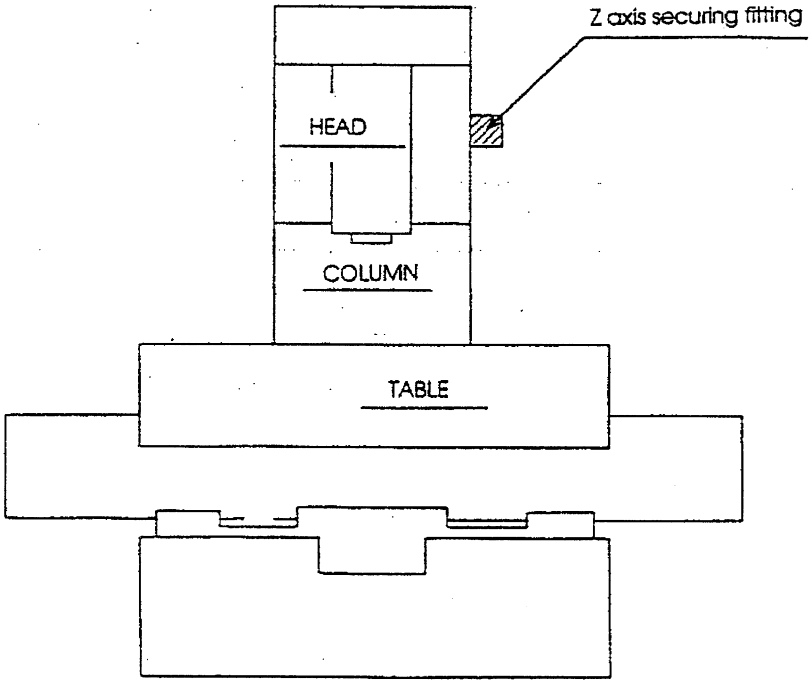


3. PRECAUTIONS WHEN MOVING THE EQUIPMENT

When moving the machining center with a crane or forklift, take the following step in order to avoid damaging the machine.

1) SECURE THE HEAD

Set a wooden block between the head and the table to keep the head from dropping while the equipment is being moved.



2-2 PREPARATION BEFORE INSTALLING THE MACHINE

1. ENVIRONMENT AND FOUNDATION

(1) ENVIRONMENT

⚠ CAUTION

- ☐ When installing the machining center near a source of vibration is unavoidable, consider providing a vibration-proof trench or channel for it.
- ☐ If the machining center must be installed on a foundation that is weak or unsupported, use pile driving construction to prevent the equipment from sinking or tilting.

- **When installing the machining center, avoid the following kinds of locations.**

1) Where direct sunlight strikes the equipment, near a heat source, or in a place where an air conditioning fan blows on the machinery.

   The ambient operating temperature should be 5°C to 35°C.

2) Locations where the temperature fluctuates sharply, or very humid places. [Relative humidity should be 75% or less for normal operation, or a maximum of 90% for a short time (less than one month); with no condensation.]

   The insulation will deteriorate under conditions of high humidity, and this could speed the deterioration of parts as well.

3) Particularly dusty locations, places where there is a high concentration of organic sprays or corrosive gases, or places where the air is likely to contain oil mist.

4) On a weak or unsupported base, or near a source of vibration. (The vibrations in the environment should be less than 0.5G.)

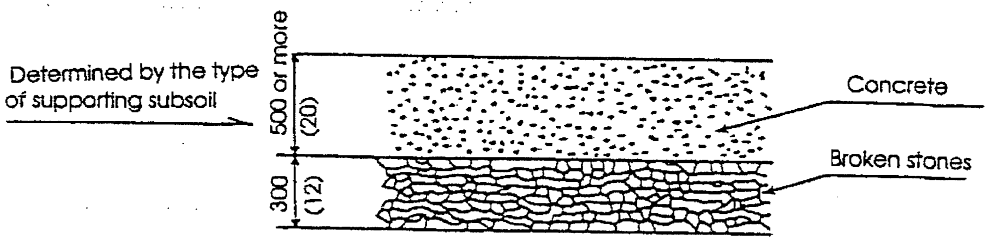
5) Locations where voltage fluctuations exceed ±10% of the rated voltage, locations where the frequency is more than 50/60Hz±1Hz, and places which are subject to strong electrical or magnetic fields or noise. Any of these conditions could create problems for the control unit and cause it to wear out quickly.

(2) FOUNDATION

The machining center must be installed on a level concrete floor. The thickness of the concrete and the floor area depend on the condition of the foundation.

The figure below shows the approximate type of foundation that should be provided.

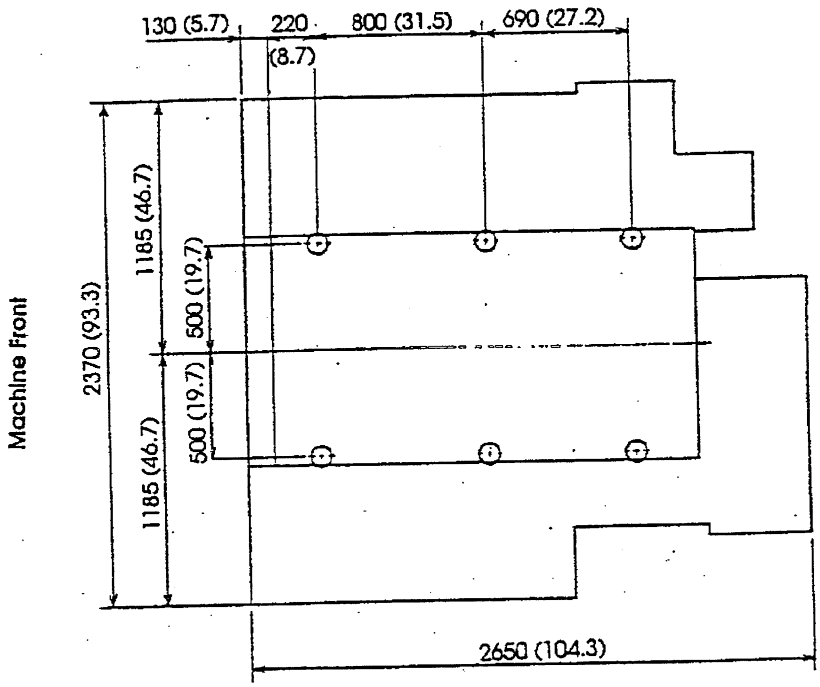
Unit = mm (inch)

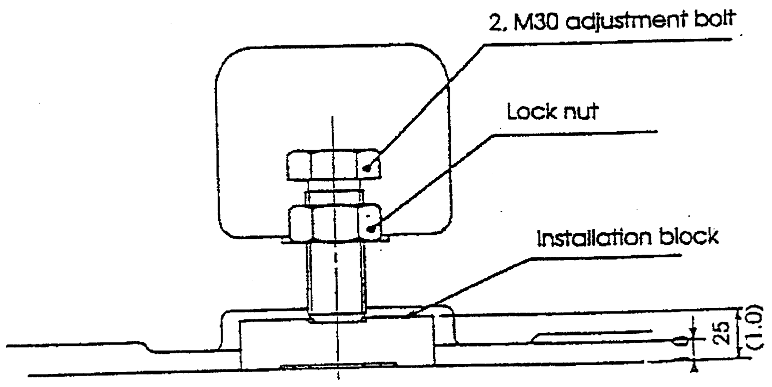


(3) POSITION OF LEVELING BLOCKS

To install the machining center, position the installation blocks as shown in the illustration below, and set the machine evenly on the blocks so that the adjustment bolts on the legs of the machine sit squarely on the leveling blocks. Then level the machine. (To make sure the machine is level, please refer to "4. Leveling" on page 76.)

Unit = mm (inch)

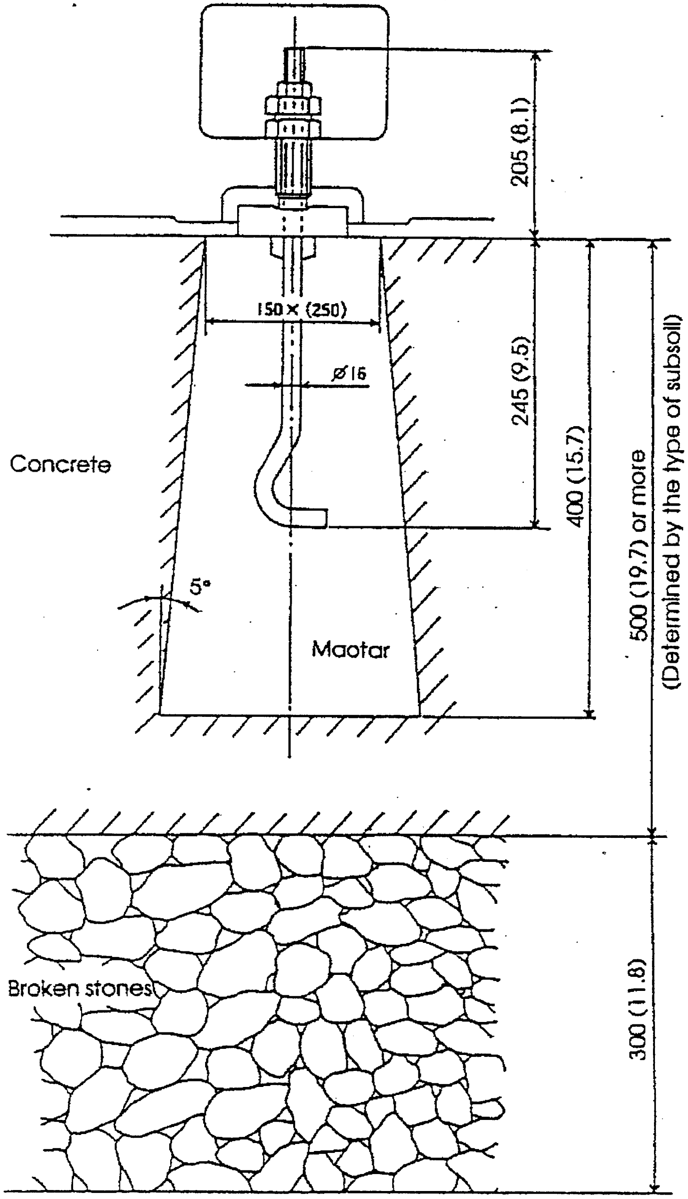




(4) FOUNDATION BOLT

Refer to the figure below when driving in the foundation bolt. (Foundation bolts, etc. are optional accessories.)

Unit = mm (inch)



NOTE

- ☐ We request that customers make their own arrangements for foundation bolts and concrete foundations for installation.

2. LUBRICATION OIL AND CUTTING FLUID

(1) LUBRICATION OIL

The type of lubrication oil depends on the location where it is used. The table below shows the appropriate type of oil (shown by ISO classification) appropriate for each location where lubrication is required (in general categories), as well as the amount of oil required. Please prepare the appropriate types of oil before installing the machining center. For the brand names of the lubricants, refer to the table at page 97.

Lubrication Point	Name of Lubrication Oil by ISO Type	Tank Capacity
Spindle head	FC5	20 lit.
Magazine chain	Molycote grease (Dow-Corning) *	–
ATC unit	CC150	7 lit.
Hydraulic unit	HL32	10 lit.

* This is not the name by ISO classification, but the brand name.

(2) CUTTING FLUID

The type of cutting fluid (water-soluble, oil-based, etc.) should be selected based on the material of which the workpiece is made, the processing conditions, and other factors.

The tank capacity is 200 liters.

⚠ DANGER

1. **When the machine is operated using an oil-based cutting fluid, there is a danger of fire due to the machine parts overheating.**
2. **The machine must be attended by the operator throughout the operation, and the operator must take appropriate protective actions to prevent fires from occurring.**
3. **In case of unmanned operation, it is recommended that the machine be provided with a fire alarm system and an automatic fire extinguisher.**

2-3 PREPARATION FOR OPERATION AND LEVELING

1. REMOVING THE RUSTPROOFING AGENT

NOTE

1. Remove the rustproofing agent applied to sliding surfaces and rotating surfaces at the time of shipping, as well as dust and other elements that adhere to surfaces during transportation, by rubbing the surfaces hard with light oil or kerosene (do not use any other kind of oil). Be careful not to get any cleaning oil on the inner surfaces of the wipers.

   Neglecting to remove this rustproofing agent could adversely affect the precision and the life of the machine, especially if dust gets mixed in.

2. After cleaning the moving surfaces to remove rustproofing material, apply the specified amount of lubrication oil (the type specified for the machining center).

   Neglecting to do this could cause moving surfaces to rust, adversely affecting the precision and life of the machine.

2. SUPPLYING LUBRICATION OIL AND ADDING CUTTING FLUID

(1) SUPPLYING LUBRICATION OIL

⚠ CAUTION

- ☐ **Using the wrong type of lubricant or a poor grade of lubricant can lead to lubrication defects and/or temperature abnormalities, thus affecting operation and machining precision.**

1. The unit is shipped with no oil in the oil tank, so before doing anything else, make sure all of the necessary locations are supplied with a good grade of oil in the specified amount.

   For information on the types, quantities, and brand names of oil for various lubricating locations, please refer to pages from 96 to 98.

2. When supplying lubricant, make sure it is completely free from the contamination by dust, chips or any other foreign substances.

(2) ADDING CUTTING FLUID

1. The cutting fluid tank is separately installed on the right side of the main body of the machining center. Replenishment or addition of the fluid is performed through the oil pan punched metal mounted to the machine above the tank.
2. When adding the fluid, supply it until the oil level is indicated between "H" and "L" marks on the level gauge fitted to the side of the tank. The tank capacity in full is approximately 200 liters.
3. To drain off the cutting fluid, remove drain plugs from drain ports provided in the tank bottom at three places. (For drainage procedure, please refer to the section 5, "Cutting Fluid Unit" on page 112.)

3. REMOVING THE SECURING FITTINGS

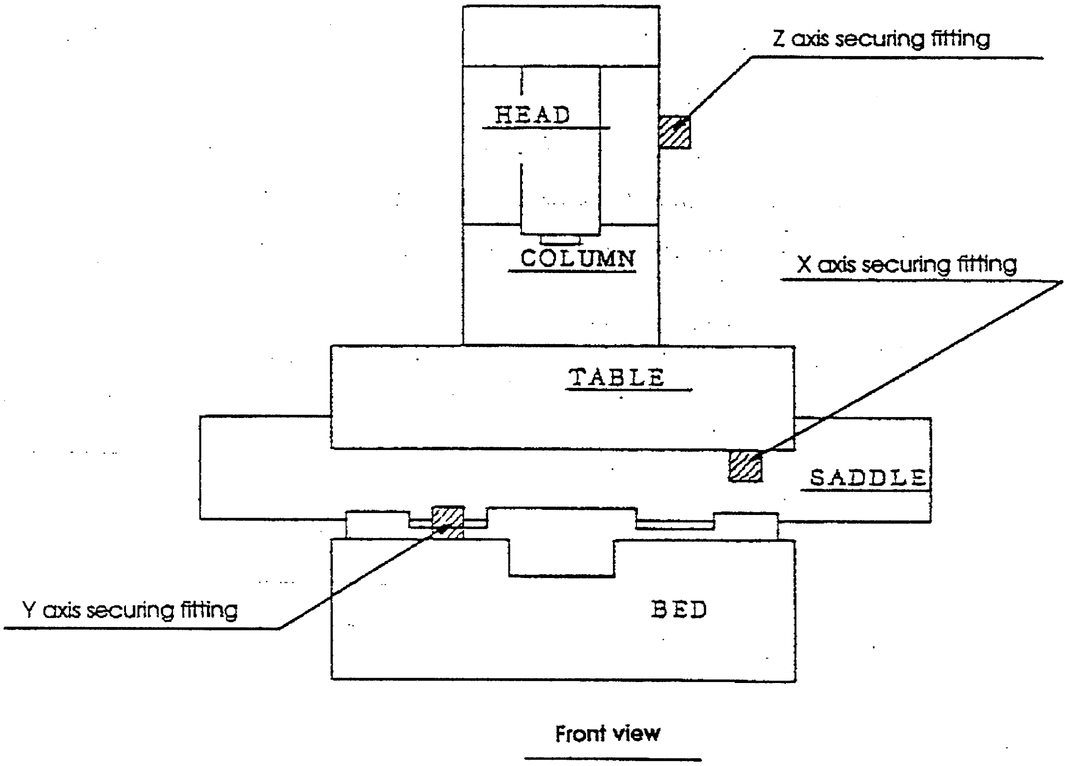
The metal fittings used to prevent damage to parts during transportation of the machining center should be removed following the procedure outlined below. (Refer to the illustration.)

(1) SECURING FITTING FOR THE Y AXIS

1. Remove the bolt holding the fitting in place.
2. Remove the fitting.

(2) SECURING FITTING FOR THE X AXIS

1. Loosen the bolt holding the securing fitting in place.
2. Using the manual pulse generator, move the X axis to a position where the securing fitting can be removed.
3. Remove the bolt for the securing fitting, then remove the fitting.



Mounting locations of securing fittings

4. LEVELING

⚠ CAUTION

- ☐ For a while just after installation, the machine can go out-of-level due to unforeseeable causes, so the levelness should be checked at regular intervals.

To level the machine, prepare the tools given in (1) "Required Tools" and follow the steps in (2) "Procedure".

(1) REQUIRED TOOLS

- 41mm wrench
- 2 levels
- Jack
- Grindstone
- Dial gauge

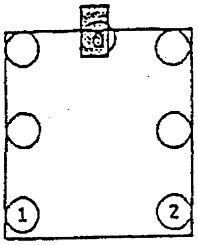
(2) PROCEDURE

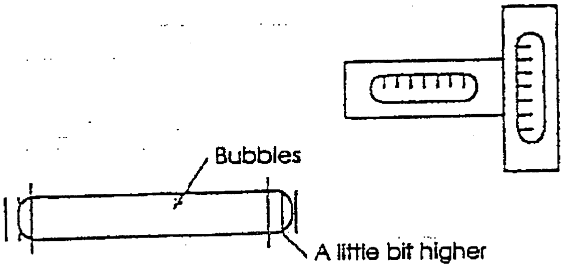
1. Clean the table top.

   Use a grindstone to remove oil and grime.

2. Shift axis location so that each axis is positioned at the center of its stroke.

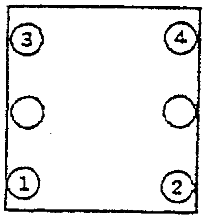
3. Take a level of the machine at three points, using the leveling bolts (0), (1) and (2) (see the figure below). Set the two levels on the table top.



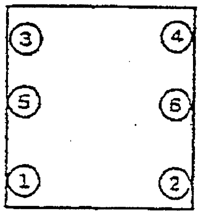


Remember indicated level readings; for example, if either side comes out to be a little bit higher than the other, the same level condition must be achieved when the level is taken at four points in the next step. Otherwise, a twist may be given to the machine.

4. Level the machine at four points using (3) and (4) instead of (0) in the previous step, and (1) and (2). Do in the same manner as in the step 3.



5. Set leveling bolts at (5) and (6). When tightening these bolts, do not apply excessive torque, instead, make them faintly effective.



6. Check the swing diameter. The indicator should read less than 0.01mm/300mm dia.

7. Tighten the lock nut securely.

☐ Leveling operation is complete.

NOTE

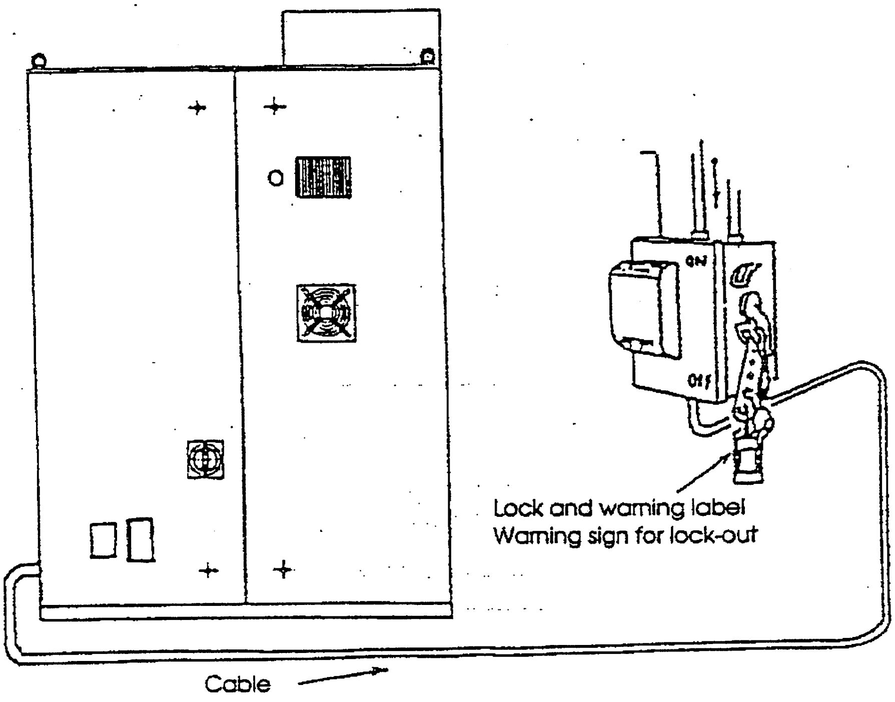
1. A levelness within 0.06mm/m must be achieved to complete leveling operation of this machine.
2. Twist should be adjusted within 0.005mm/m.

5. CONNECTING THE POWER SUPPLY AND THE AIR SOURCE

(1) CONNECTING THE POWER SUPPLY

⚠ DANGER

1. Before connecting the power, check to make sure that the power is cut off. Neglecting to do this could cause serious injuries to occur.
2. Lock up the switchboard and post warning labels so that electrical switches cannot be operated by other people while the work is in progress.



Switch panel

Control box

1 The following requirements must be met in supplying power to the machining center.

200VAC±10% 50/60Hz±2% 3ø 58.2kVA (Ref. value 43kW)

220VAC±10% 60Hz±2% 3ø 58.2kVA (Ref. value 43kW)

Cable of at least 30mm² (same size as main grounding cable)

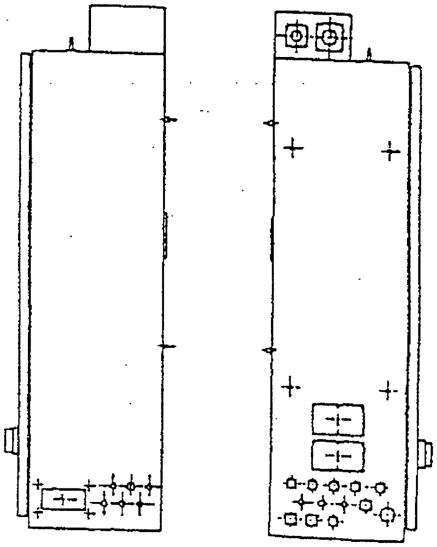
Ground-fault circuit breaker (including a leakage-current protective relay) operates with 100mA as the rated tripping current. If you use your own breaker, it should meet the same specification.

2 Pass the power cable through the hole in the bottom side of the power control box and connect it directly to the primary terminal of the breaker. Always make sure the equipment is grounded by connecting the cable to the G terminal on the breaker attachment plate.

3 (1) After connecting the power supply to the breaker, check the phase rotation direction. The hydraulic unit motor on the left of the machining center should be rotating in the direction indicated by the arrow.

(2) At the time of shipping, the phase rotation is set for the normal (forward) direction when the hydraulic unit oil motor is rotating in the normal (forward) direction.

(3) If the phase rotation is reversed, switch the terminals to which the R and T phases are connected on the primary side of the breaker.



Control box

(2) CONNECTING THE COMPRESSED AIR SUPPLY

⚠ CAUTION

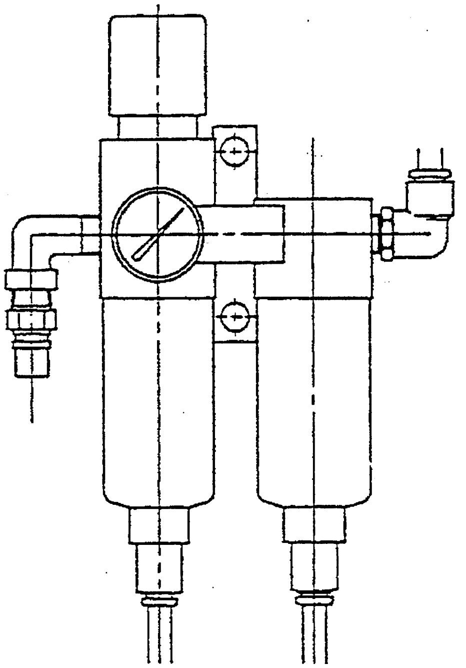
- ☐ **If there is dust or moisture in the compressed-air source, the spindle opening and tool shank may rust, and this could lead to breakdowns of the cylinders and valves.**
- ☐ **Make sure all dust and moisture are removed from the air supply.**

1) The compressed-air unit is installed at the rear of the machining center. Insert a hose to the hose nipple at the pneumatic unit using care to keep dust and other foreign matters from entering the unit, and secure it with a hose band.

2) The air used should be free of compressor oil and other elements. Make sure only clean air is used.

3) The air pressure for this unit is adjusted to 0.4MPa (4kg/cm^2) at the time of shipping. The air consumption is estimated at approximately 540N ℓ /min.

4) From time to time, the water contained in the air will drip from the bottom of the air filter or the mist separator, and drain out due to the auto-drain feature.



2-4 PRECAUTIONS WHEN THE ADDITIONAL AXIS (ABS MOTOR) IS REMOVED

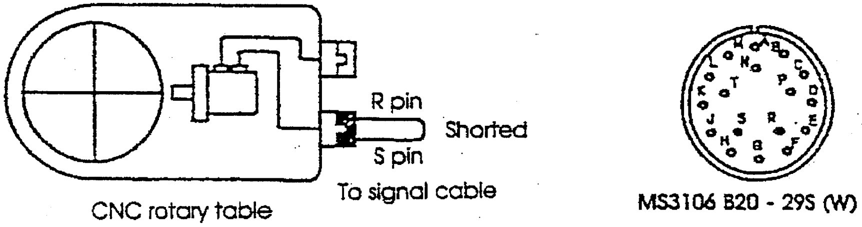
CAUTION

☐ **When the signal cable cannon connector is disconnected from the additional axis motor for more than 48 hours, always fit the short-circuited connector, furnished as an accessory, to the plug socket. Note that re-setting of the machine zero point will be necessary when the motor is connected once again with the cannon connector.**

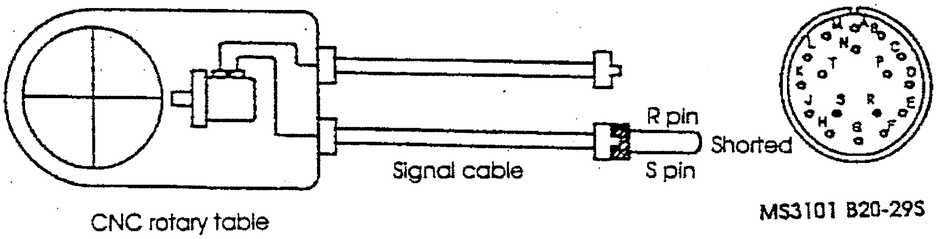
1. METHOD OF DISCHARGE

Connect the suuplied cannon connector on which R pin and S pin are shorted, to the signal line receptacle at the CNC rotay table side, and leave it short-circuited for more than 5 minutes. Discharge may also be performed by connecting the relay connector to the signaling cable end, depending on the type or manufacturere of the CNC rotary table.

(1) Short-Circuiting at CNC Rotary Table Side:



(2) Short-Circuiting at Signal Cable End:

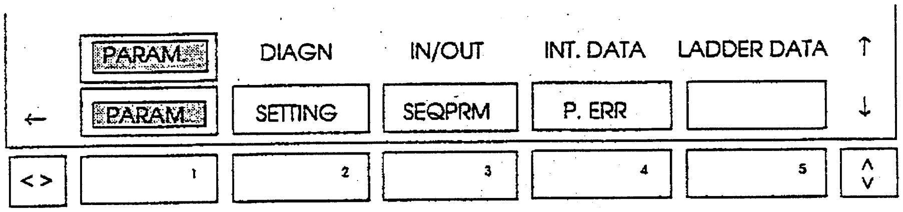


2. NC OPERATION FOR SETTING ORIGIN

1 Check that the spindle is precisely located at the origin (zero point).

2 Select ZERO RETURN mode.

3 Press the [MAINT] key several times to call the parameter menu on the screen.



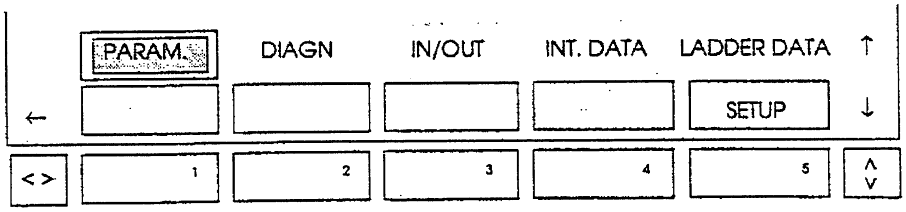
4 Change the setting for parameter #8814 to 0:

Parameter No.	8811 (X)
Parameter No.	8812 (Y)
Parameter No.	8813 (Z)
Parameter No. ◎	8814 (4)

NOTE

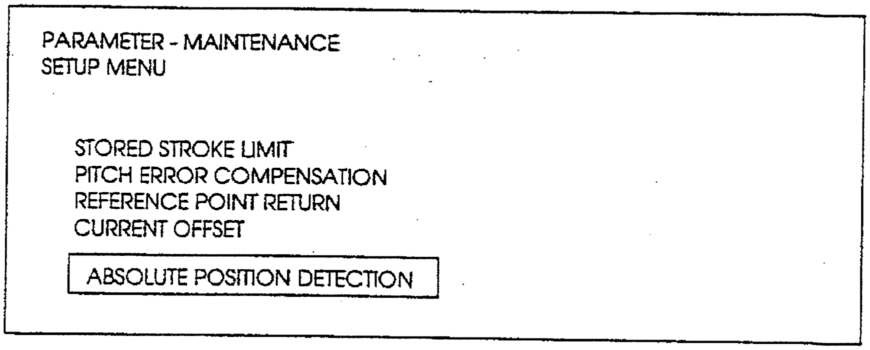
❐ The origin cannot be positioned accurately if this parameter setting is not made correctly.

5 Press the [< >] button at the lower left side of the LCD. The [SETUP] menu will appear at the lower right of the display.

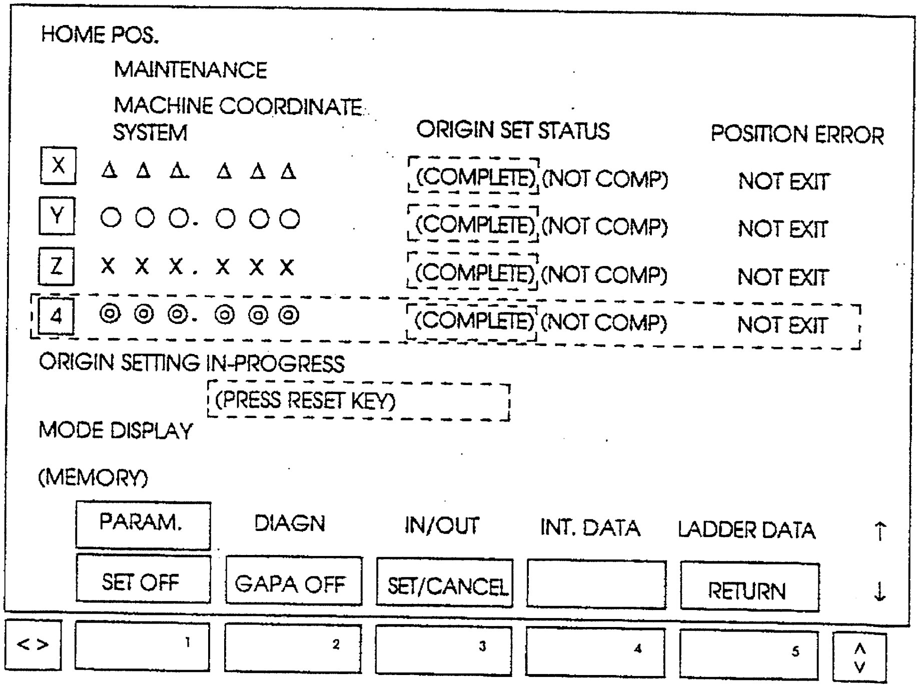


6 Press [5] and select [SETUP].

7 Press the [▲] or [▼] key and select [ABSOLUTE POSITION DETECTION] on the LCD menu. Then press the [WR] key.



8 Check that the ORIGIN SET menu is displayed.


HOME POS.
MAINTENANCE

	MACHINE COORDINATE SYSTEM	ORIGIN SET STATUS	POSITION ERROR
X	△ △ △. △ △ △	(COMPLETE) (NOT COMP)	NOT EXIT
Y	○ ○ ○. ○ ○ ○	(COMPLETE) (NOT COMP)	NOT EXIT
Z	× × ×. × × ×	(COMPLETE) (NOT COMP)	NOT EXIT
4	◎ ◎ ◎. ◎ ◎ ◎	(COMPLETE) (NOT COMP)	NOT EXIT

ORIGIN SETTING IN-PROGRESS
(PRESS RESET KEY)
MODE DISPLAY
(MEMORY)

74500

9 When origin set is complete:

1 Press the [1] key and select [SET OFF]. Next, with the (▲) (▼) keys, select the axis for which cancelling the origin set is desired and press the [WR] key.

2 The origin setting status display changes to "NOT COMP".

3 The message "PRESS RESET KEY" is displayed in the center of the screen.

4 Press the [RESET] key.

10 When origin set is incomplete:

1 Press the [3] key and select [SET/CANCEL]. Next, with the (▲) (▼) keys, select "4" and press the [WR] key.

2 The origin setting status display changes to "COMPLETE".

3 Check that the machine coordinate value changes to 0.000. Next press the [RETURN] key and the procedure is now complete.

4 Turn the power off and then turn it back on again. Check that the origin point is the same.

3 MAINTENANCE

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3-1 PERIODIC INSPECTION

NOTE

1. In order to prevent problems with the machining center such as maladjustment, breakdowns, and abnormal wear of parts, and to keep the machining precision as high as possible, it is extremely important to carry out regular maintenance work such as daily inspections, adjustments, and replacement of worn out parts.

   Periodic inspection intervals and inspection points are summarized in the following table.

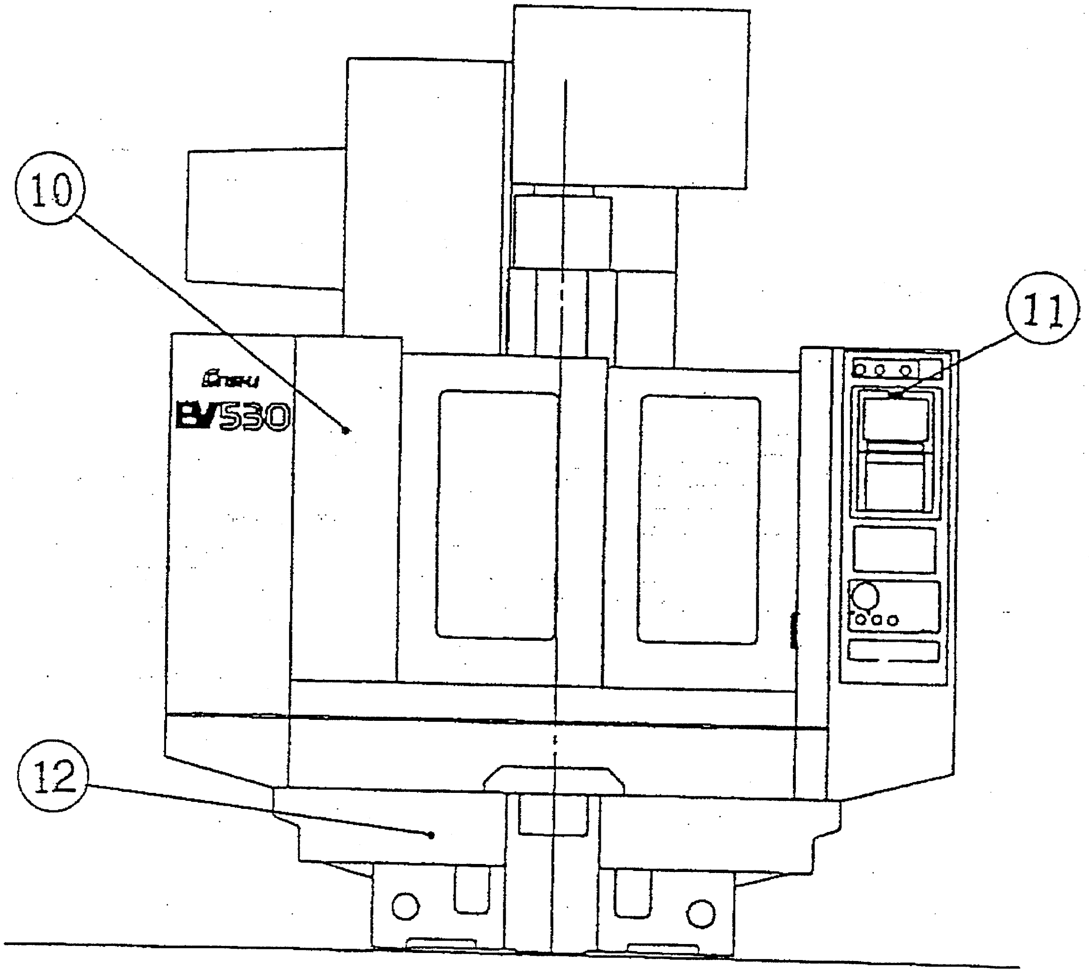
2. Periodical inspection items are shown in the charts on the following pages. However, depending on the materials used for the workpieces and the operating conditions of the machining center, it may be necessary to include weekly inspection items as well. The optimum maintenance plan should be determined by the plant management.

Inspection intervals	Inspection points
■ Daily	☐ Check depletion of consumable parts or materials, and supply or replace if necessary ☐ Remove chippings ☐ Inspect gauges and check movement of ATC and each axis
■ Monthly	☐ Supply grease to ATC parts ☐ Check for clogged filters, and wash if necessary
■ Every 3 months	☐ All of the above + check for disorders with machining center installation level ☐ Check the amount of oil for the ATC unit with the oil level gauge.
■ Every 6 months	☐ All of the above + the following items ☐ At normal high speed operation: inspect spindle run-out vibration; check for abnormal noise of bearings and replace if necessary
■ Annually	☐ All of the above + the following items ☐ Replace pneumatic unit filters ☐ Inspect for backlash, adjust ☐ Inspect consumable parts, replace if necessary ☐ Replace the batteries

1. INSPECTION LOCATIONS DIAGRAMS

⚠ CAUTION

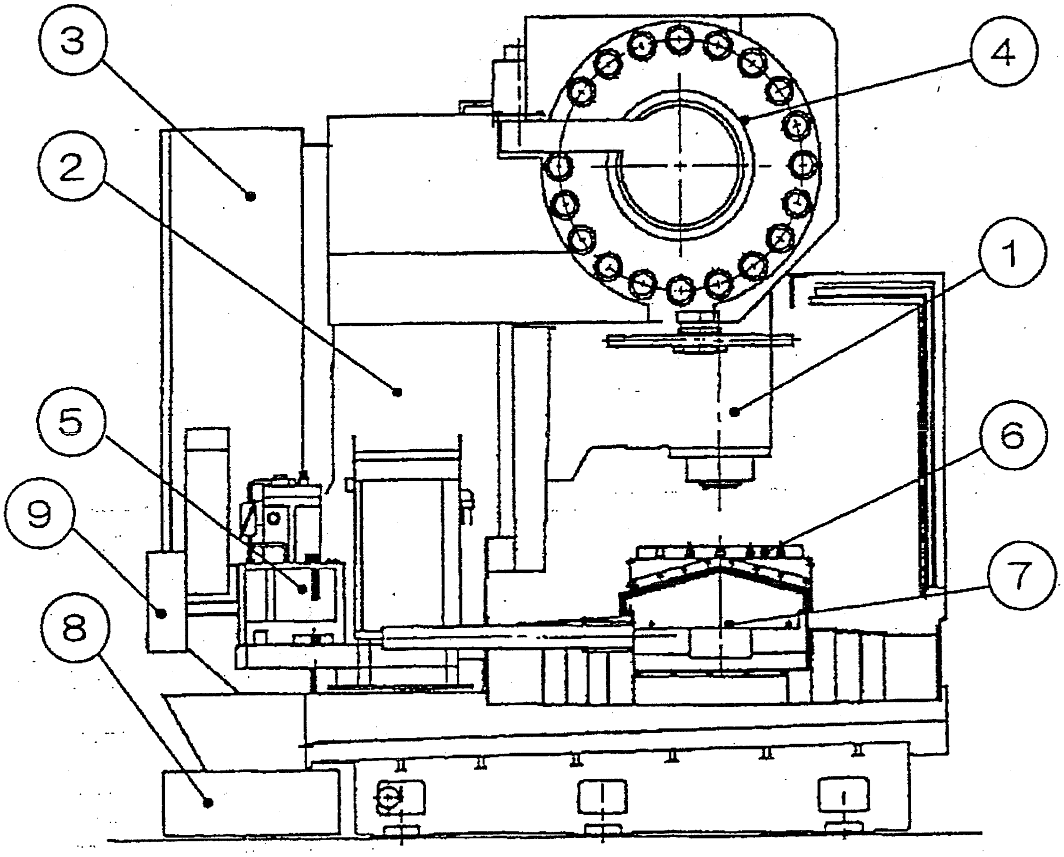
1. Learn the name and installation position of each part of the machine, and double-check these.
2. Accurate knowledge of the machine is very important for performing maintenance work correctly and thoroughly.



(10) Splashguard

(11) Power control box

(12) Bed (main unit)



(1) Head

(2) Column

(3) Electrical equipment

(4) Magazine

(5) Hydraulic unit

(6) Table

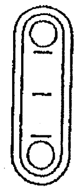
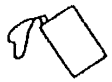
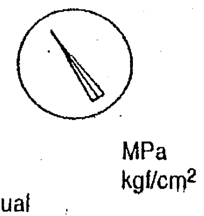
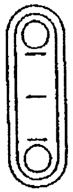
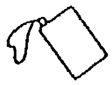
(7) Saddle

(8) Cutting fluid unit

(9) Lubrication unit (option)

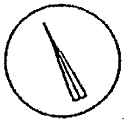
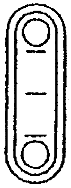
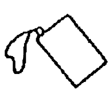
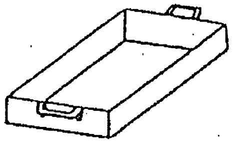
INSPECTION LOCATIONS

*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
2. DAILY INSPECTION ITEMS						
(5)	Hydraulic unit	1. Check amount of oil in hydraulic unit tank.	At rest	Oil gauge 	OK if between H and L	Add oil. 
		2. Check set pressure for hydraulic unit.	Running	Pressure gauge 	Indicated pressure or 5.9MPa {60kgf/cm^2}	Adjust with pressure adjustment valve.
		3. Rotation of hydraulic unit fan motor.	Running	Visual	Is the fan rotating?	Inspect the parts and electrical circuits.
(1)	Head	1. Check amount of spindle coolant oil.	At rest	Oil gauge 	Is it above the bottom line?	Add oil. 

INSPECTION LOCATIONS

*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
(2)	Pneumatic unit	1. Check air pressure of air supply source.	At rest	Pressure gauge  MPa kgf/cm²	Indicated pressure or 0.4MPa (4kgf/cm²) 58.015 PSI	Adjust with pressure adjustment valve.
(8)	Cutting fluid unit	1. Check oil level of coolant supply device.	At rest	Oil gauge 	OK if between H and L	Add oil. 
		2. Check coolant density.	At rest	Density meter	Within specified density	Adjust by adding oil or water.
		3. Clean chippings out of chip box. 	At rest	Visual	Amount of chips	Throw away chippings.
	Appearance and motion	1. Abnormalities or dirt on exterior, looseness in operational sections	At rest	Visual	No abnormalities	
		2. Check the movement of each part. • Do the axes move smoothly, and move at the rapid and cutting feed rates?	Running	Visual	No abnormalities	

INSPECTION LOCATIONS

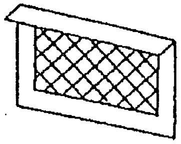
*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
		• Does the spindle rotate smoothly?	Running	Visual	No abnormalities	
		• Does the spindle make orientation stop smoothly?	Running	Visual	No abnormalities	
		• Are tools inserted and removed smoothly?	Running	Visual	No abnormalities	
		• Do all parts of the ATC move smoothly and accurately?	Running	Visual	No abnormalities	
(3)	Electrical equipment	Operation of ventilation fans for NC unit, control box, amp, and other parts	Running	Visual	Are the fans rotating?	Inspect the parts and
(3)	Rotor pack oil cooler	Check the rotation of the motor.	Running	Visual	Are the motor rotating?	Inspect the parts and electrical circuits.

3. WEEKLY INSPECTION ITEMS

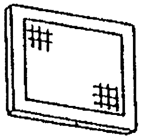
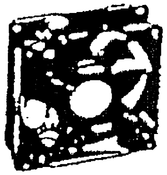
Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
	Bed (Main unit)	1. Clean the interior of the machine.	At rest	Visual	Is the volume of chippings abnormal?	Clean the unit.

4. MONTHLY INSPECTION ITEMS

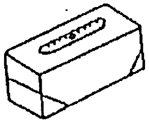
Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
(5)	Hydraulic unit	1. Check for oil leaks.	At rest	Visual	Are there any oil leaks?	Tighten more securely.
(8)	Cutting fluid device	1. Clean coolant tank filter. 	At rest	Visual	Check for clogged filters.	Clean the filter.

INSPECTION LOCATIONS

*Running: Inspect while operating; At rest: Inspect while not operating

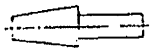
Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
	Spindle cooling unit	1. Add or change spindle cooling oil.	At rest	Visual		Replace.
		2. Clean air filter of oil cooler. 	At rest	Visual	Check for clogged filters.	Clean the filter.
(3)	Electrical equipment	1, Check all fan motors. 	Running	Visual	Is the fan motor rotating?	Check parts and electrical circuits.
	Sliding surfaces	1. Y axis sliding surfaces	At rest	Visual	Check for chippings.	Clean

5. EVERY 3 MONTHS INSPECTION ITEMS

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
	Main unit	1. Check machine levelness and adjust.	At rest	Level 		
(4)	ATC unit	1. Qty of oil in ATC unit tank	At rest	Visual	ℓ	Supply oil.

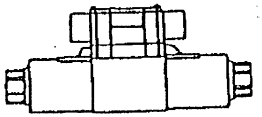
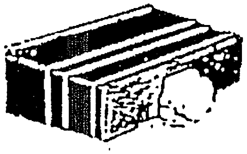
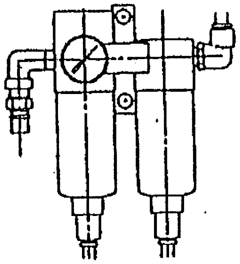
INSPECTION LOCATIONS

*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
6. EVERY 6 MONTHS INSPECTION ITEMS						
(5)	Hydraulic unit	1. Replace hydraulic unit oil and clean interior of tank.	At rest	Visual	If dirty	Clean
	Spindle cooling unit	1. Filter cleaning (intake side)	At rest	Visual	If dirty	Clean
(3)	Electrical equipment	1. NC device filter	At rest	Visual	Clogged filter	Clean
		2. Power control panel filter	At rest	Visual	Clogged filter	Clean
(1)	Head	1. Check for run-out.	At rest	Test bar 	JIS	Adjust or replace bearings.
	Magazine sprocket, chain	1. Lubrication of sprocket and chain	At rest	Visual	Every 6 months	Apply grease.
7. ANNUAL INSPECTION ITEMS						
	Main unit	1. Measure backlash pitch error.	Running	Measurement of backlash amount	JIS	Inspect ballscrews and sliding surfaces.

INSPECTION LOCATIONS

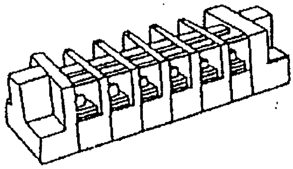
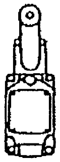
*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
	Piping circuits	1. Check hydraulic piping. 2. Inspect solenoid valves, pressure switches, control valves. 	At rest Running	Visual Visual	Loosening, oil leaks Check whether they function correctly.	Tighten. Replace parts.
	Movement	1. Inspect the telescopic cover and wiper for each axis. 	At rest	Visual	Movement, loose screws	Tighten securely.
	Spindle cooling unit	1. Replace the spindle cooling oil.	At rest	Visual	If dirty	Clean
(2)	Pneumatic unit	1. Replace the air filter element of the air supply device. 	At rest	Visual	Clogged filter	Replace

3 MAINTENANCE

INSPECTION LOCATIONS

*Running: Inspect while operating; At rest: Inspect while not operating

Symbol	Place	Inspection Item	Run./Rest	Inspection Method	Eval. Criteria	Corrective Action
(3)	Electrical equipment	1. Check and tighten all terminals. 	At rest	Visual	Make sure there is no looseness.	Tighten terminals.
		2. Check confirmation limit switches and dogs 	Running	Test run with JOG and RAPID feed.	Make sure they operate correctly.	Inspect limit switches, dogs, and relays.
		3. Inspect insulation.	Running	Visual and tester	Damage, conductivity	Replace or repair parts.
		4. Check movement of operation panel switches.	Running	Visual	Make sure they operate correctly.	Inspect electrical circuits.
		5. Inspection of machine precision	At rest		JIS	

NOTE

- ☐ For details regarding maintenance of the control device, consult the instruction manual published by YASKAWA ELECTRIC CORPORATION.

3-2 LUBRICATION AND LUBRICANTS

1. LUBRICATION

With this machining center, lubrication is carried out using the following methods.

Head/spindle unit	Grease lubrication
Sliding surfaces of axes	Grease lubrication
Ball screws	Grease lubrication
Support bearings	Grease lubrication
ATC unit	Oil bath
Magazine system	Grease lubrication

2. LUBRICATION CONTROL CHART

When carrying out maintenance inspections, please refer to the Lubrication Control Diagram on page 98, which indicates control items such as the areas requiring lubrication, the name of the appropriate type of oil for each location, and the intervals at which the oil should be replaced. For more detailed information concerning lubrication and maintenance inspections for each particular device, please refer to page 99, "3-3 Lubrication and Maintenance Inspection of the Various Units".

3. BRAND NAMES OF LUBRICANTS

⚠ CAUTION

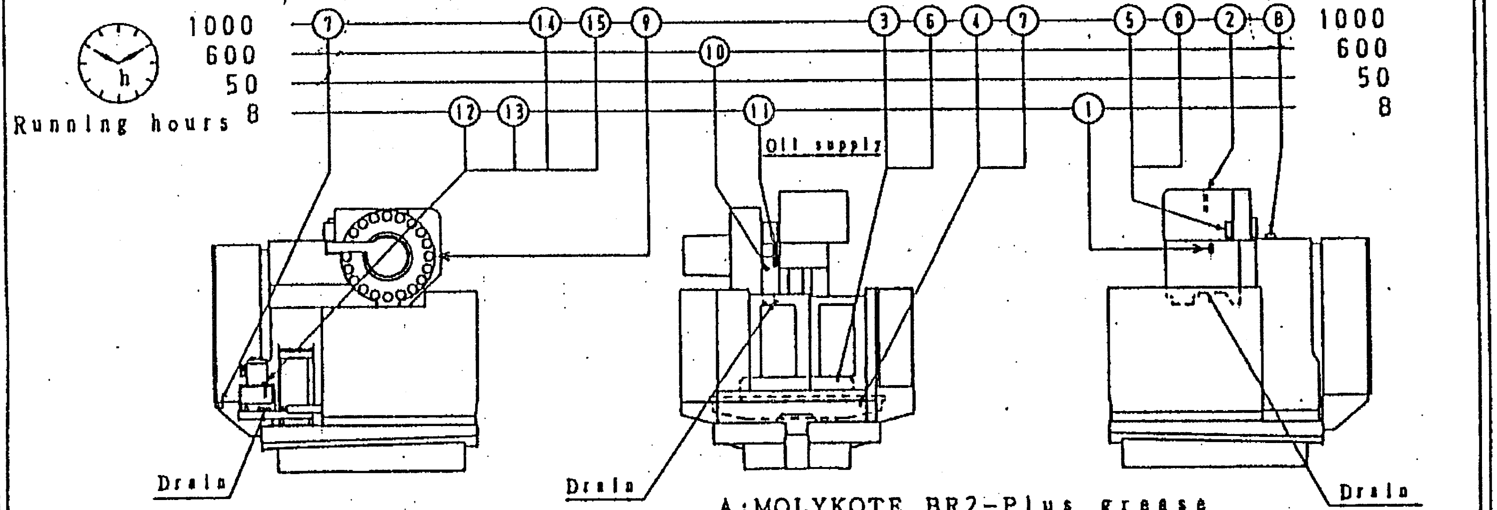
1. **If the wrong kind of lubricant or a poor grade of lubricant is used, the quality of the lubricant may deterioriate or abnormal tempuratures may occur, causing problems with machine operation or affecting the machining precision.**
2. **Do not mix different brands of oil, even though they appear under the same group. (Be especially careful when replenishing oil when there is still some in the tank.)**

The Lubrication Control Chart indicates oil in terms of ISO classifications, but the brand names pertaining to these classifications are listed below by the company that manufactures them. Select a brand name which is available in your area for use with your equipment.

BRAND NAMES OF LUBRICANTS

Symbol Company Name	FC5	G68	HL32	A	CC150
Idemitsu Kosan	Daphne Super Multi-oil 5	Daphne Way Lube 68U	Daphne Fluid AW32U		Daphne Super Gear oil 150
Esso Oil	Spinesso 5	Febis K68	Teresstic 32		Spartan EP 150
Showa Shell Oil	Tellus Oil 32, C32 J-H32	Shell Tona oil 68	Shell Tellus oil 32	Albania No.2	Omala oil 150
Mobil Oil	Mobil DTE Oil Light	Mobil Vactra Oil No.2	Mobil DTE Oil Light		Mobil gear 629
Dow Corning				Molycote BR2 Plus Grease Molycote G Rapid Spray	
Castrol	Hyspin AW5	Waylube 68	Hyspin AWS32		EP 150 Gear oil

Control chart of lubrication



A: MOLYKOTE BR2-Plus grease

Machine component	Spindle head		Linear guide			Ball screw			Magazine	ATC		Hydraulic unit			
			X	Y	Z	X	Y	Z							
Action point No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Symbol of action / Nature of action													MPa		
Check (h)	8									8		8	8		
Replenish (h)			1000	1000	1000	1000	1000	1000	1000						
Clean or replace (h)														1000	
Change (h)		1000									600				1000
Lubricant designation	FC5		MULTEMP LRL3 grease						A	CC150		HL32			
Tank capacity (l)	.23		–	–	–	–	–	–	–	7		10			
Reservoir capacity (l)	As suitable														

Lubrication Control Chart

3-3 LUBRICATION AND MAINTENANCE INSPECTION OF THE VARIOUS UNITS

1. OIL SUPPLY TO THE HEAD — SPINDLE COOLING UNIT

(1) SPINDLE COOLANT CIRCUIT

The spindle coolant device is used to cool down the head/ spindle unit. The path of coolant circulation is shown in the diagram below.

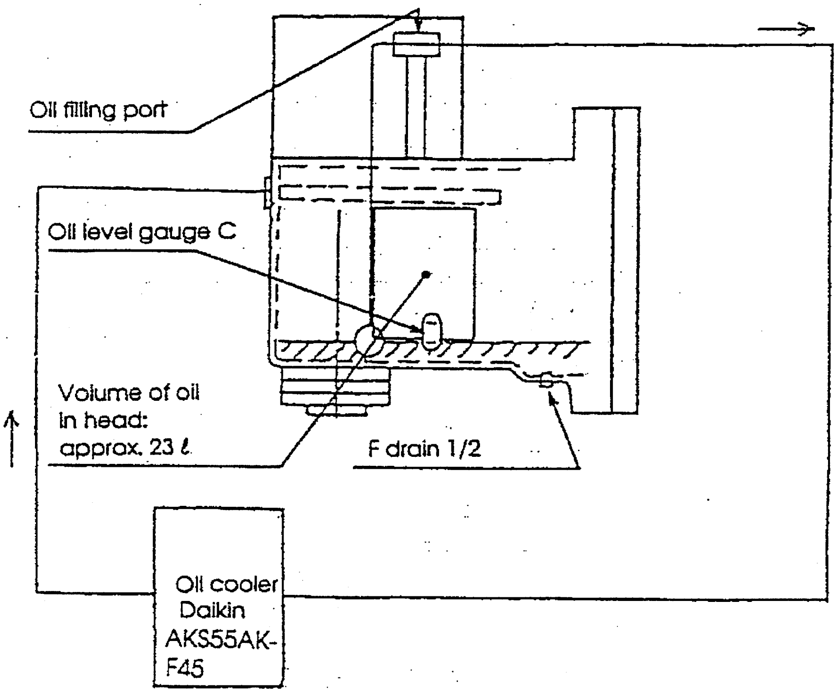

Oil filling port
Oil level gauge C
Volume of oil in head: approx. 23 ℓ
F drain 1/2
Oil cooler Daikin AKS55AK-F45

Diagram of Spindle Cooling Oil Path

(2) SUPPLYING COOLANT

⚠ CAUTION

1. **Oil in the spindle can cause overheating, so be especially careful when supplying oil this area.**
2. **When oil is being replenished and replaced, never use different brands of oil mixed together.**
3. **The machining center is shipped with no oil in the oil tank. Make sure all areas indicated in the Lubrication Control Chart on page 100 are lubricated before beginning operation.**

1. The type of oil used for coolant should be FC5.

   (For information on FC5 oil, please refer to the table of lubrication oil product names on page 97.)

   The volume of oil supplied should be 23 liters.
2. Watching the oil level gauge C, the location of which is indicated in the "Spindle Cooling Oil Path" diagram on the previous page, pour oil in slowly through the filling port.
3. Be careful not to let any dirt or foreign substances get mixed in with the oil.
4. To change the oil, remove the head drain plug F and drain away the waste oil through the drain hole.
5. For the location of this unit, refer to the "Lubrication Control Chart on page 98.
6. While filling the tank, always turn off the power supply.

(3) MAINTENANCE INSPECTION

1. Before starting up the machinery, check the oil gauge to make sure the oil level is between the H and L marks. If the oil level has dropped to the L mark, add the same brand of oil to replenish the tank.
2. For information on oil supply intervals and locations, please refer to the section on periodic inspections on page 86.

(4) OVERALL SPECIFICATIONS OF THE SPINDLE COOLING UNIT

Model		DAIKIN AKS55K
External dimensions (height x width x depth)		708x 360 x 440mm (27.9 x 14.2 x 17.3 inch)
Oil pump	Model	Trochoid pump
	Discharge (50/60Hz) lit./min	12.1/14.4
Motor (shared with fan pump)		0.4 KW
Usable oils		Hydraulic operation oil, lubrication oil (The following may not be used: hydraulic operation oils containing phosphates, chlorates, carbides, hydrides, water + glycol combinations, W/O O/W emulsions; also, water, water-soluble liquids, chemicals, foodstuffs, fuel, cutting or grinding oils.)
Connecting pipes	Oil inlet	Rc3/4 (internal thread)
	Oil outlet	Rc3/4 (internal thread)
	Oil drain	UNF7/16-20 (internal thread) (cover plug)

2. SUPPLYING OIL TO THE HYDRAULIC UNIT

NOTE

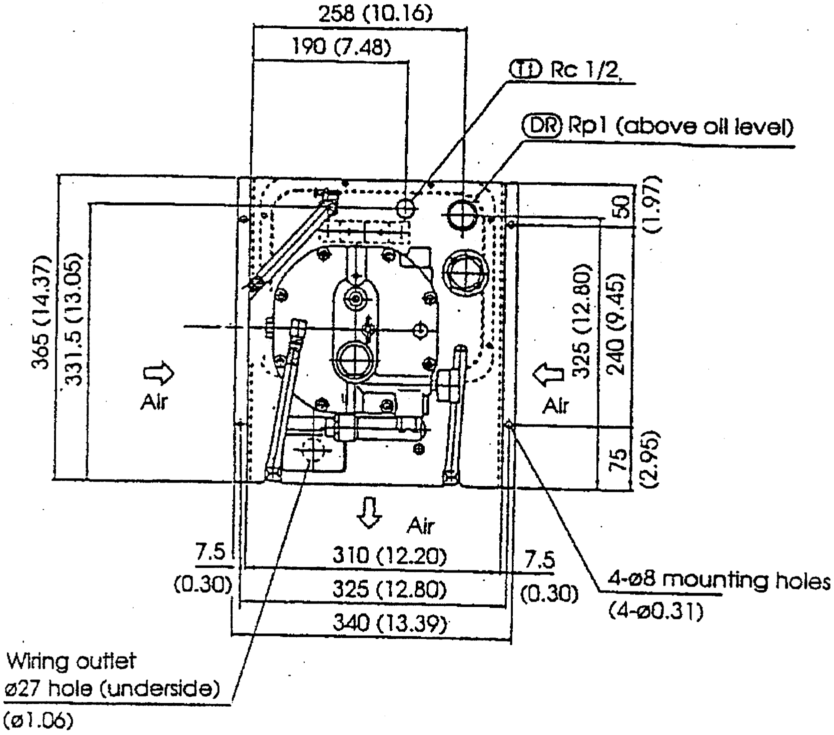
- ❒ **When the machine is used in a cold area, the operating oil for the hydraulic unit should be one rank lower in the viscosity.**

(1) HYDRAULIC UNIT

This unit is used for pot rotation, spindle tool clamping and unclamping. The specifications, general dimensions, and hydraulic circuit diagram for the unit are shown below.

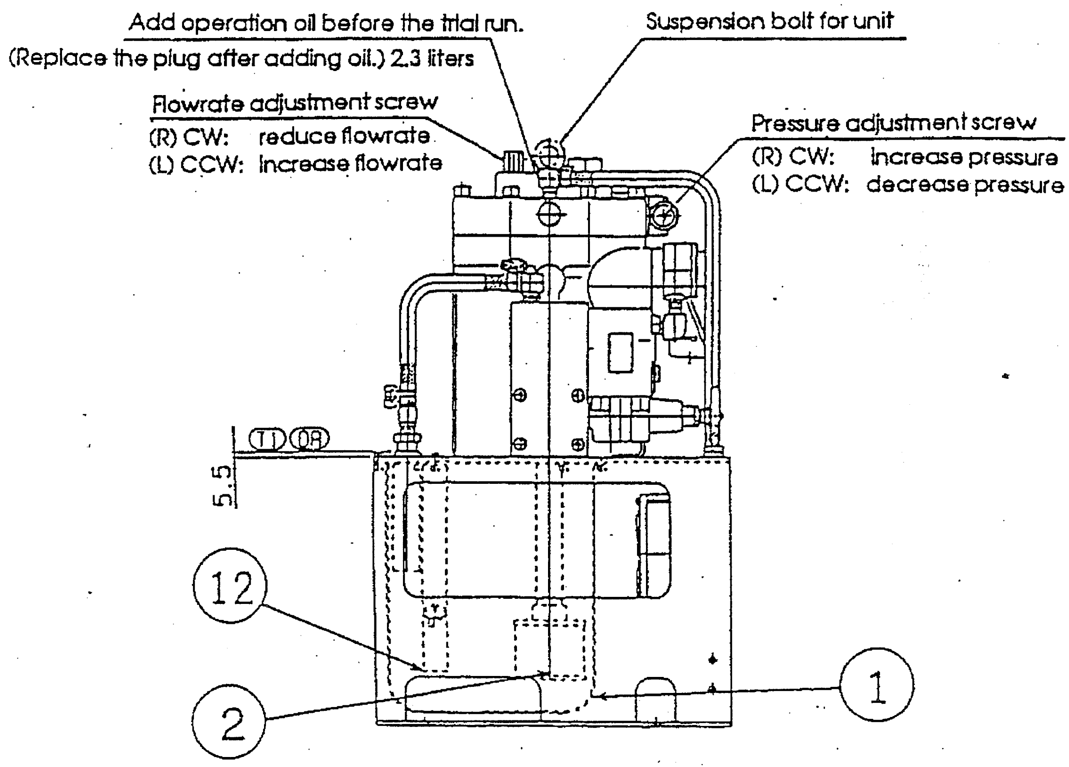
Specifications for the Hydraulic Unit

Pump pressure	5.9MPa {60kgf/cm²}
Pump discharge	21 ℓ /min (50Hz), 24 ℓ /min (60Hz)
Pump input	Approx. 2.2kW
Operation oil	ISO VG32 Hydaulic oil (R&O)
Power supply	Power system 200V 50/60Hz

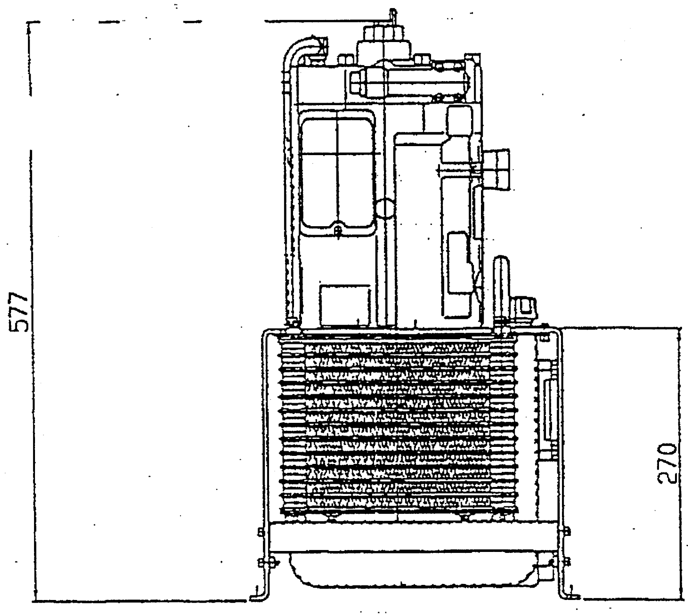


Hydraulic unit: plane view

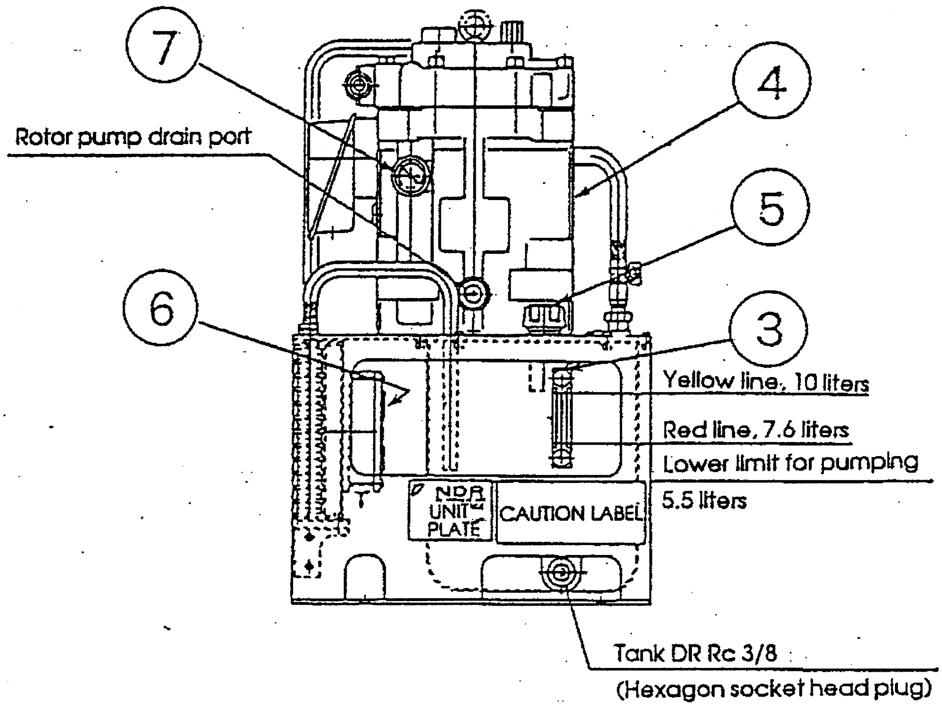
3 MAINTENANCE


Add operation oil before the trial run.
(Replace the plug after adding oil.) 2.3 liters
Suspension bolt for unit
Flowrate adjustment screw
(R) CW: reduce flowrate
(L) CCW: increase flowrate
Pressure adjustment screw
(R) CW: increase pressure
(L) CCW: decrease pressure
(T1)(OR)
5.5
12
2
1

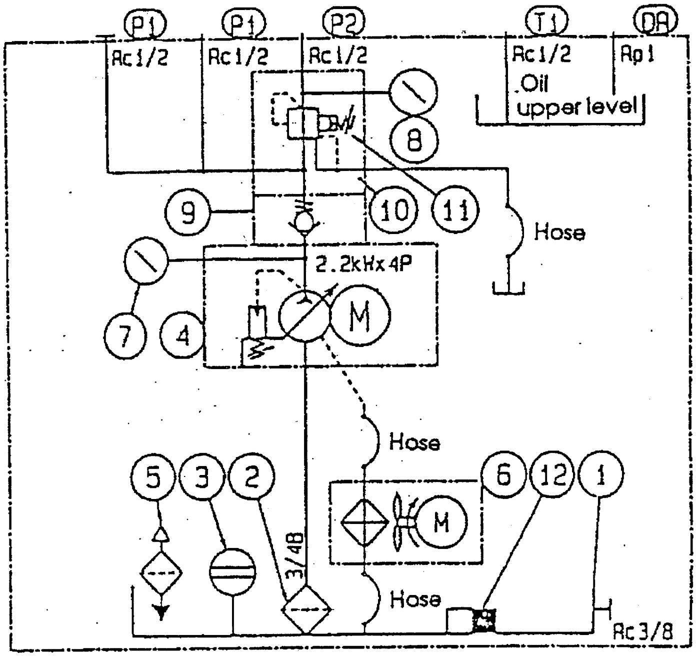
Left side view



Front view



Right side view



Hydraulic circuit diagram

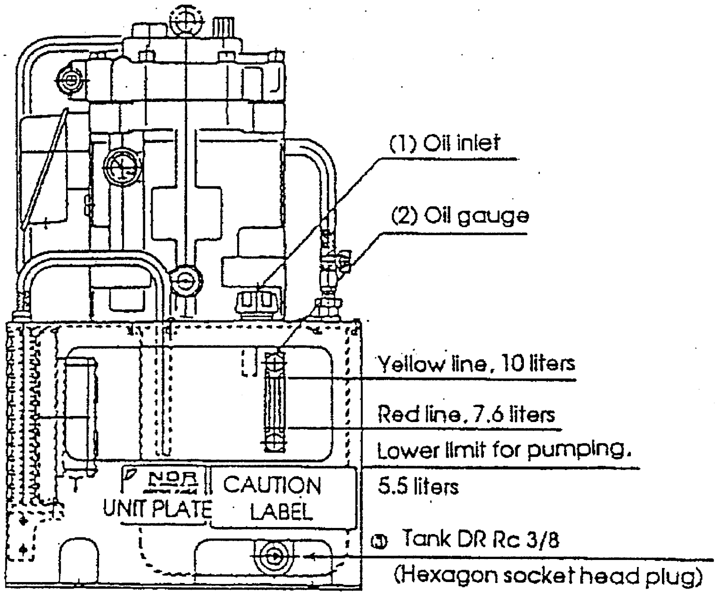
(2) SUPPLYING OIL

1. The type of oil used should be HL32.

   (For information on HL32 oil, please refer to the table of lubrication oil brand names on page 97.)

   The volume of oil supplied should be 10 liters.

2. Pour oil through the oil inlet (1) shown in the diagram below. To change the oil, remove the drain plug for the tank (3), and drain out the used oil.
3. Be careful not to let any dirt of foreign matter get mixed in with the oil.
4. For the location of this device relating to the main unit, please refer to the Lubrication Control Chart on page 98.



(3) MAINTENANCE INSPECTION

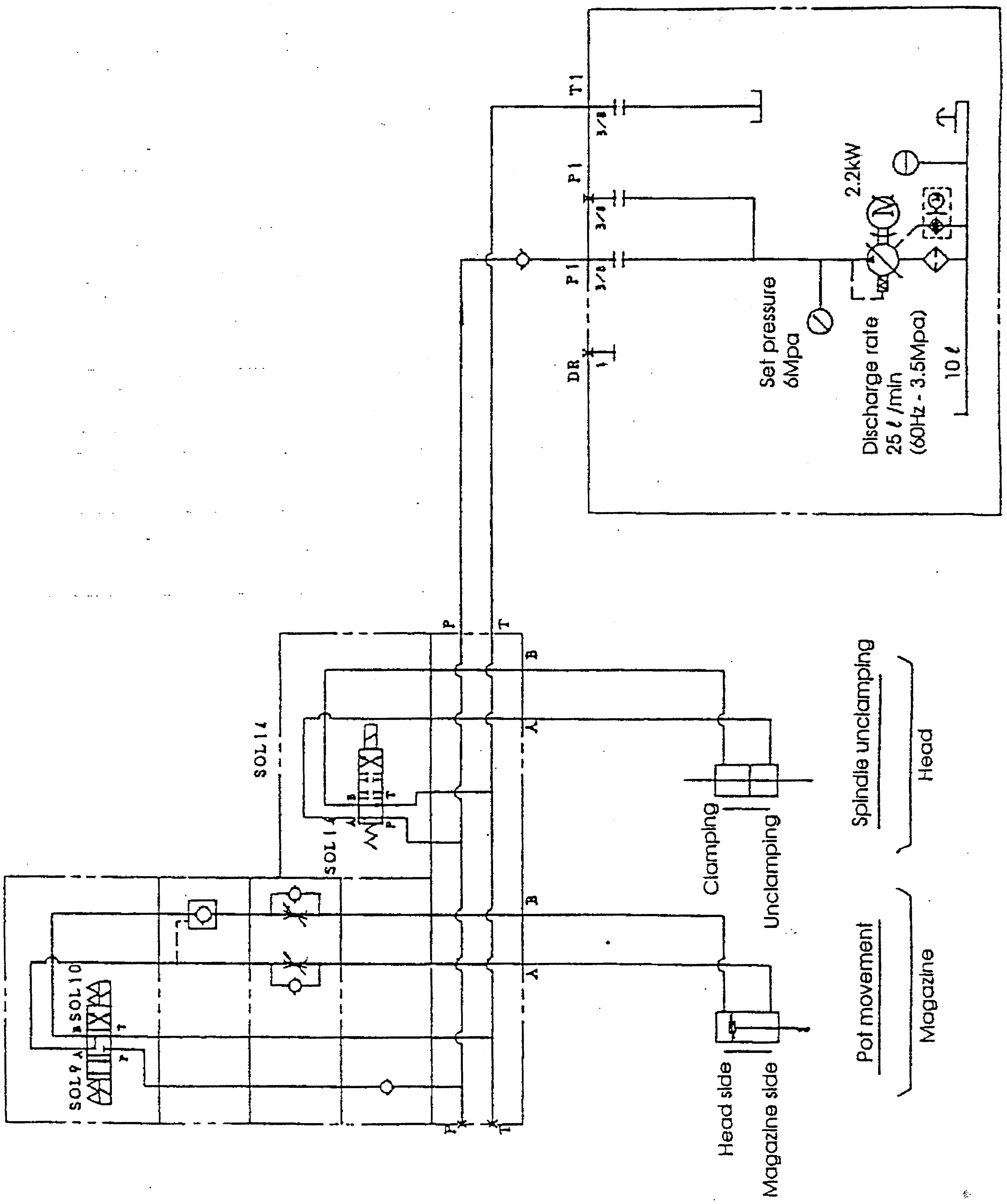
⚠ CAUTION

- ☐ When replacing the oil, there may be cases in which air is mixed with the oil, causing problems with ATC operation.
- ☐ After changing the oil, always do a dry run of ATC operation as described on page 115, under "Dry Run of the ATC Unit".

1. Before starting up the machinery, check the oil gauge to make sure the oil level is between the H and L marks. If the level of oil in the tank has dropped to the L level, it should be replenished with oil of the same brand.
2. For information on filling intervals and locations, please refer to the Lubrication Control Chart on page 98.
3. For other information pertaining to inspections, please refer to "3-1 Periodic Inspection" on page 86.

HYDRAULIC CIRCUIT DIAGRAM

For information on Enshu products numbers, manufacturer models, and other specifications, please refer to the table on page 123.

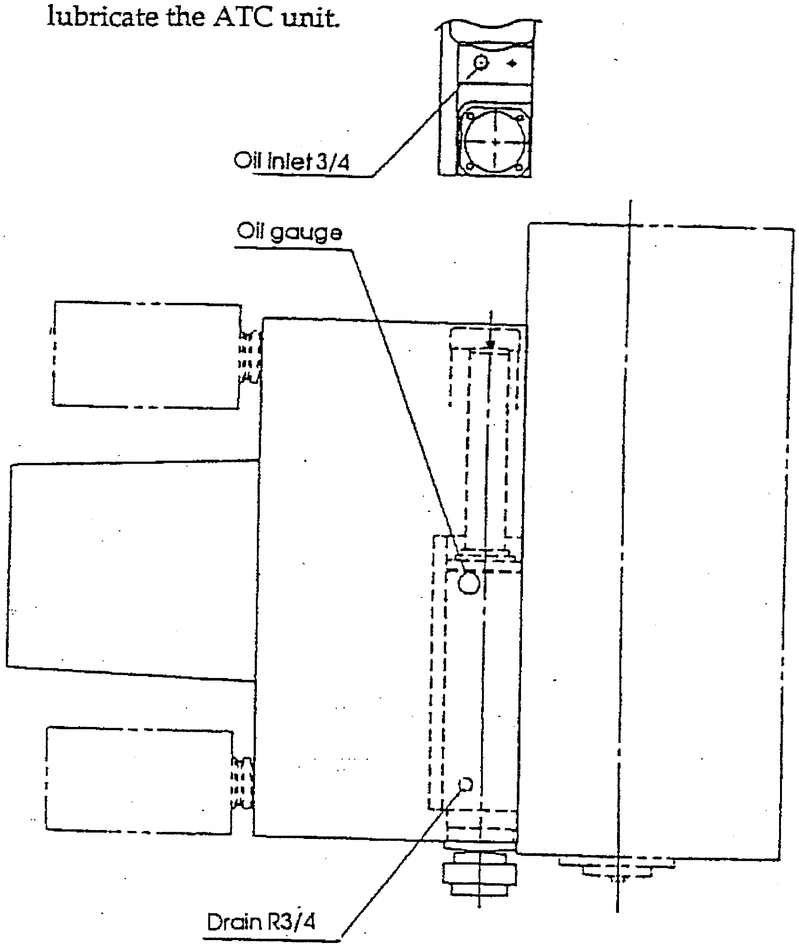


3 MAINTENANCE

No.	Name	Qty.	Model	Manufacturer
1	Oil tank	1	10L	Daikin
2	Suction strainer	1	DHA-06-150	Tsukasa Industries
3	Oil gauge	1	KLA-80SA	Kyowa
4	Rotor pump	1	RP15A1-22-10-001	Daikin
5	Oil port/air breather	1	MSA-V22	Masuda
6	Oil cooler	1	DCR10BP-10-03	Daikin
7	Pressure gauge	1	ADGT-PT-1/4-ø39X150KX15MPa	Yodogawa Keiki
8	Pressure gauge	1	PAG-PT-1/4-ø50x150Kx15MPa	Yodogawa Keiki
9	Check valve	1	BD-RPMC-10-120	Daikin
12	Magnetic contaminant catch	1	MFB-50B	Sumitomo Materials

3. LUBRICATING THE ATC UNIT

The oil bath shown in the illustration below is used to lubricate the ATC unit.



(1) SUPPLYING OIL

1. The type of oil used for lubrication should be CC150.

   (For information on CC150 oil, please refer to the table of lubrication oil product names on page 97.)

   The volume of oil supplied should be 7 liters.

2. Remove the cover and pour oil through the oil inlet shown in the figure above. To replace the oil, remove the drain plug on the bottom of the tank and drain the oil through the hole.

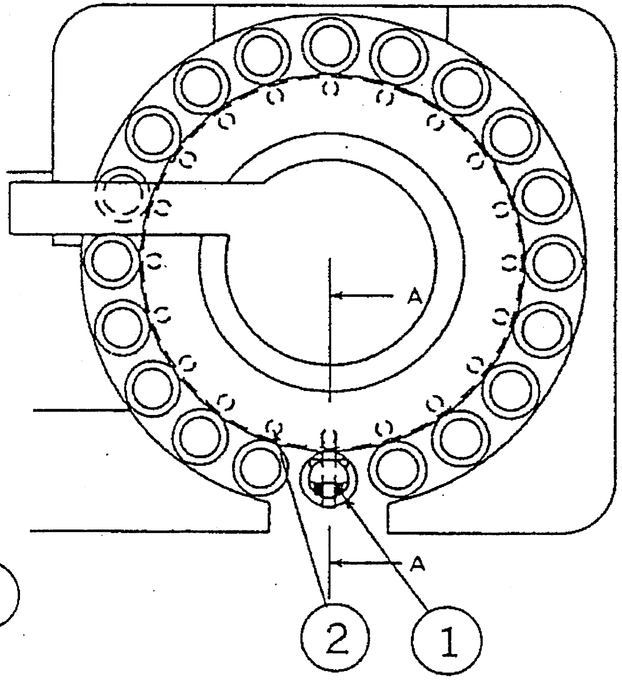
3. Be careful not to let any dirt or foreign matter get mixed in with the oil.

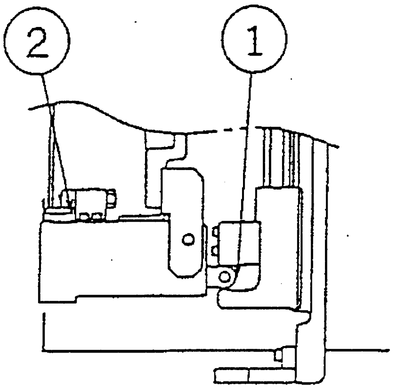
(2) MAINTENANCE INSPECTION

1. Before starting up the machinery, check the oil gauge shown in the figure above. If the level of oil in the tank has dropped to the L level, it should be replenished with oil of the same brand.
2. For information on lubrication intervals, please refer to the Lubrication Control Chart on page 98.

4. LUBRICATING THE ATC 20-POT MAGAZINE

About once every six months you need to apply grease to the part where the roller passes through the pot drop unit (1) and the roller units (2) that are attached to the front of each of the pots at the top. When lubricating (2), it is easy to apply grease if you do them one at a time with the pot set.



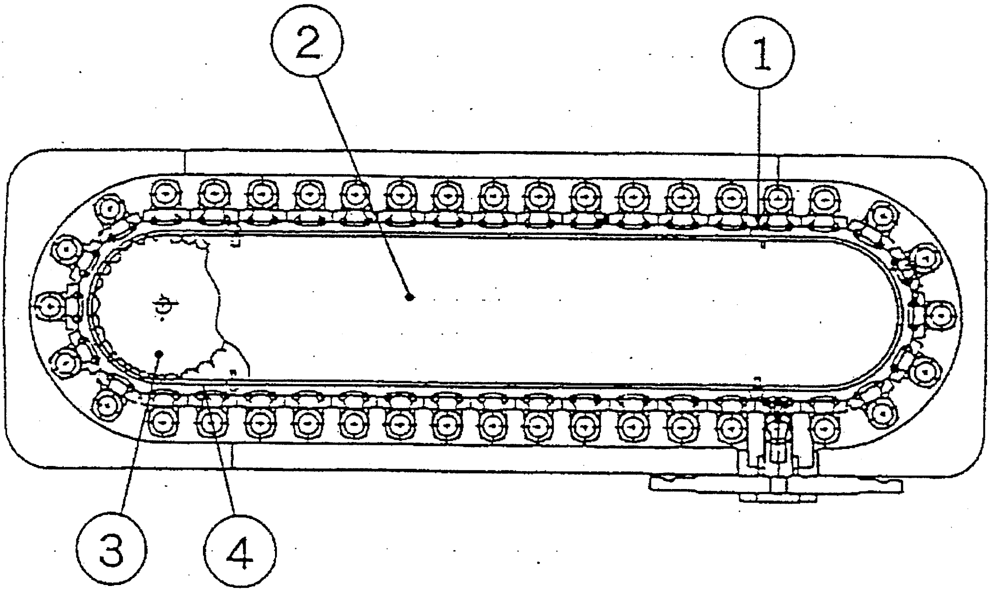


Section; A-A

LUBRICATING THE ATC 30-POT MAGAZINE (OPTION)

(1) LUBRICATION

1. Grease should be applied to the sprocket and chain in the magazine once every six months. (For the brand names of greases, please refer to the list of product names on page 97.)
2. Loosen the four bolts (1) of the ATC magazine on the top left of the machining center, remove the cover (2), and apply grease to the sprocket (3) and chain (4) located inside the cover.
3. After applying the grease, replace the cover in its original position.



5. CUTTING FLUID UNIT

(1) ADDING CUTTING FLUID

1. The cutting fluid tank is a separate unit installed on the right side of the machining center. Fluid is added to the tank through the punched metal part of the oil pan mounted on the machine, above the tank top.
2. Add fluid until the level reaches a point between the "H" and "L" marks on the level gauge, on the side of the tank. The tank will hold approximately 200 liters.
3. Cutting fluid should be drained through the three drain plugs on the bottom of the tank.

(2) CLEANING THE FILTER ON THE CUTTING FLUID TANK

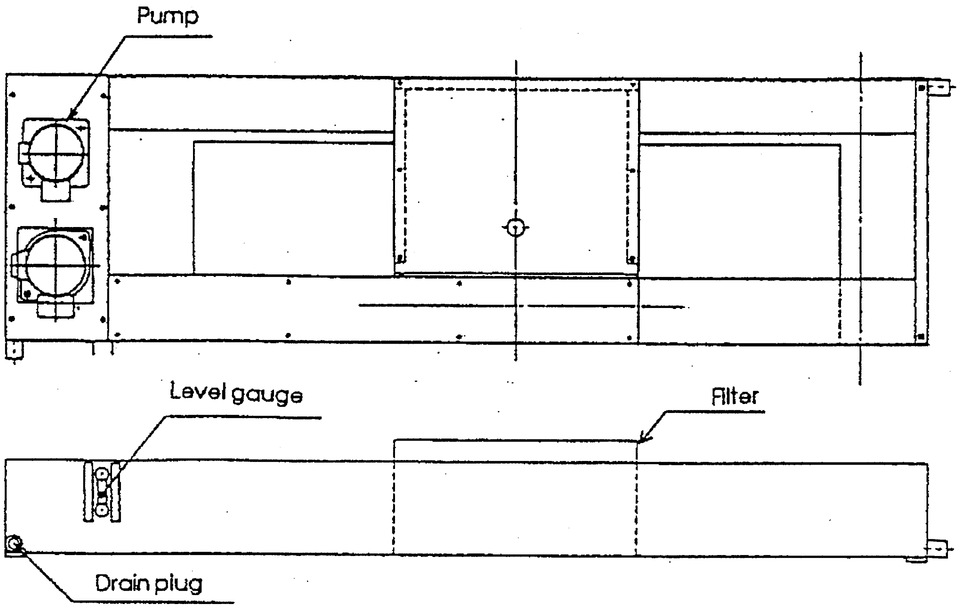
1. Remove the filter from the cutting fluid tank and clean it.

(3) CLEANING THE CUTTING FLUID TANK

1. Chip particles sometimes get mixed in with the cutting fluid inside the tank. The cutting fluid should be drained off occasionally through the drain ports and the inside of the tank cleaned.

(4) SPECIFICATIONS OF THE CUTTING FLUID DEVICE

Tank capacity	200 liters
Motor	250W/200V
	Discharge rate: 110-160 liters/min
With valve	4 nozzles



6. PNEUMATIC UNIT AND CIRCUIT DIAGRAM

(1) SPECIFICATIONS FOR THE PNEUMATIC UNIT

Pneumatic Unit	SMC model AC3040-03DG (Enshu product number: BBK8301TAA)	
Guaranteed withstand pressure	1.5MPa {15kgf/cm²}	
Maximum working pressure	1.0MPa {10.2kgf/cm²}	
Rated pressure range	0.05-0.85MPa {0.5-8.5kgf/cm²}	
Filtration	Filter:	5μm
	Mist separator:	0.3μm

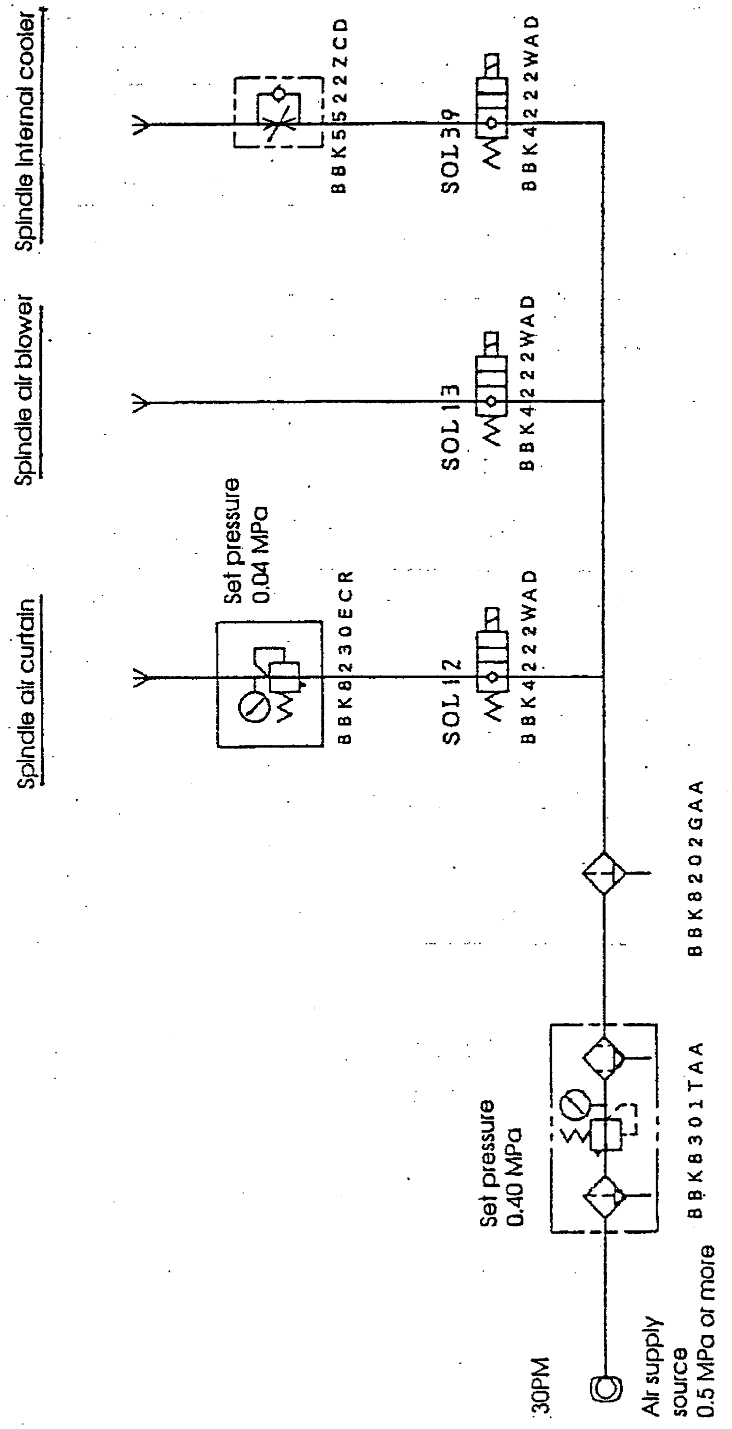
(2) MAINTENANCE INSPECTION

1. Before running the machine, check to make sure that the pressure gauge reading is 0.4MPa {4kgf/cm²}. If not, adjust the pressure using the pressure-reducing valve on the pneumatic unit.
2. The filter elements in the air filter and mist separator should be replaced once a year, as a rule, but more frequently if conditions warrant.

Air filter element	SMC No. 111585
Mist separator element	SMC No. 630617

(3) PNEUMATIC CIRCUIT DIAGRAM

(For information on Enshu product numbers and manufacturer models, please refer to the table on page 123.)



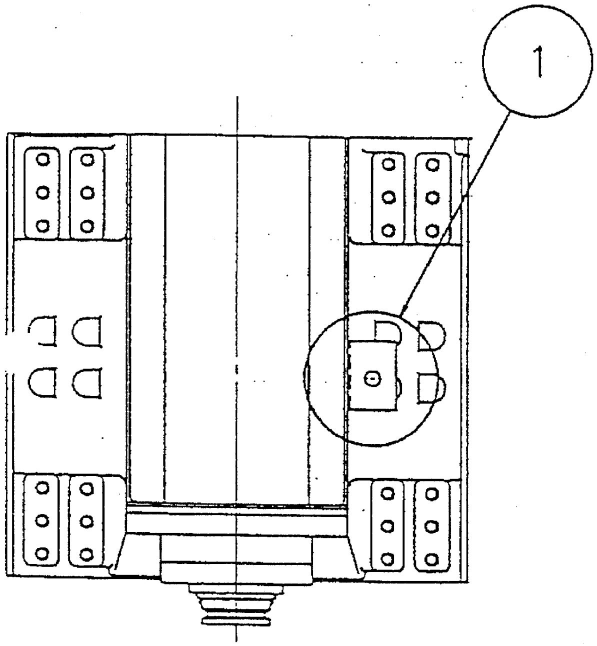
7. DRY RUN OF THE ATC UNIT

During the oil change of the hydraulic unit, which is done just after the machine installation, or periodically in the maintenance work, the air will get into the hydraulic circuit. This may cause a time lag in tool unclamping of the ATC unit, resulting in the occurrence of an ATC operation error.

Therefore, each after filling the tank, carry out the following operation to expel the air from the hydraulic circuit.

1 Turn on the power supply.

(See page 54 of the Operator's manual, "2 -1 Turning the Power On".)



2 Move the selector switch (1) forward and backward ten times.

3 Position the Y and Z axes at their zero points, and use ATC operation to move the X axis to a point where it will not cause interference.

Then set the spindle in its fixed position.

(See page 64 of the Operator's manual, "5 Spindle Orientation-Fixed Position Stop".)

4 Return the magazine to its zero point.

(See page 80 of the Operator's manual, "3-1 Magazine Zero Return".)

5 Carry out a dry run of the ATC unit with no tool in the spindle, using the following program.

```
O XXXX ;
M06 ;
G04 X3. 0 ;
M99 ;
```

6 **Continue dry run for approximately 10 minutes.**

This bleeds the air out of the circuits of the air.

☐ **Dry-run procedure is complete.**

8. PARAMETERS

Parameters are numeric values which are arranged in a specific order in order to move the machinery normally through its various functions. These parameters are stored as part of the software that operates the machinery.

This software is designed not for each specific function, but for each machine unit, and is therefore supplied with that particular machining center when it is purchased.

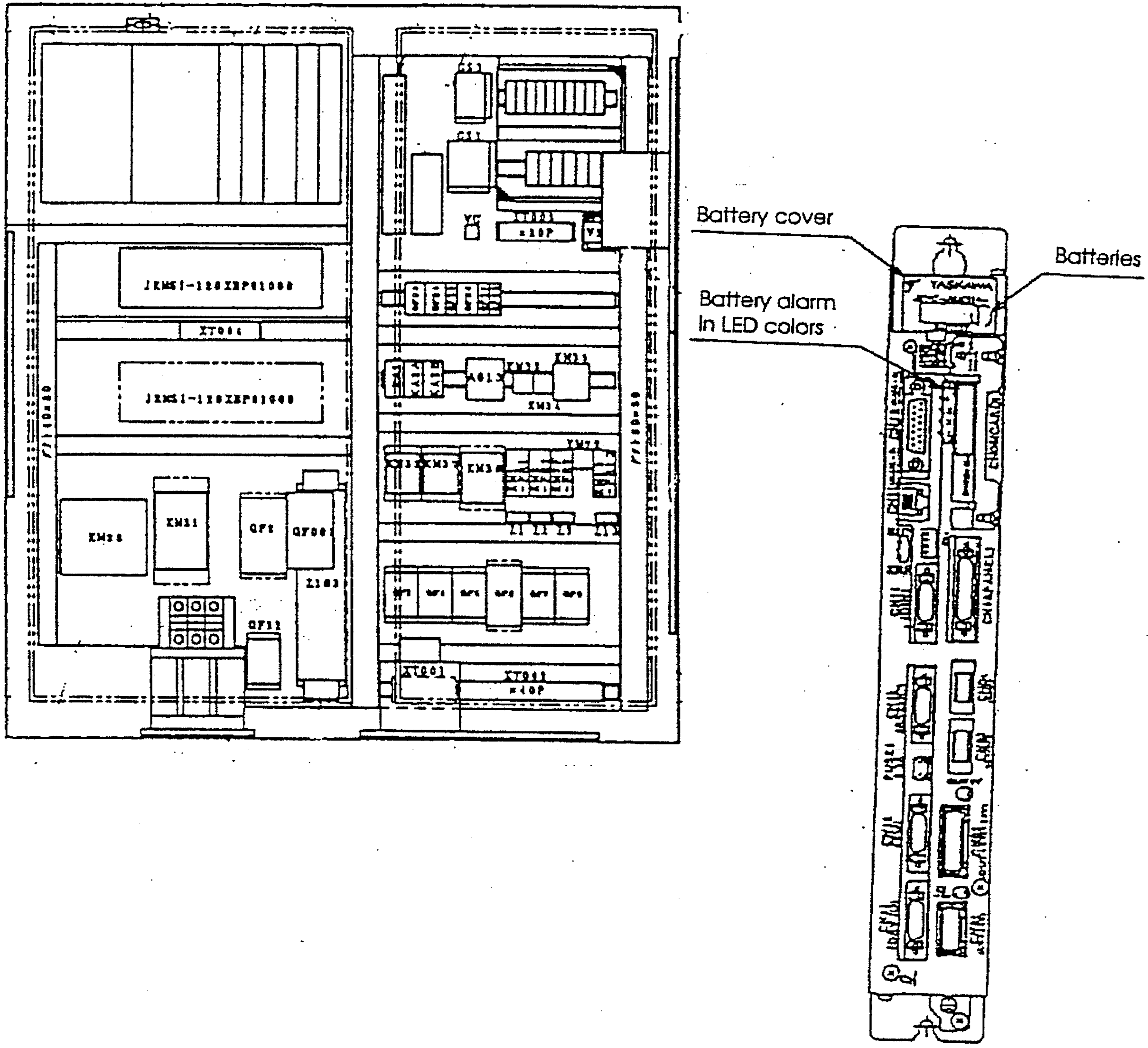
The list of parameters is an extremely crucial part of the maintenance documentation for that machine, because it is needed if problems occur; for example, if the battery which backs up the memory runs down, causing software to be erased.

The "Inspection Results" for your machine will be invariably accompanied by the "Parameter List", so please keep it carefully as an important documentation.

9. REPLACING THE BATTERIES FOR MEMORY BACKUP

NOTE:

- ☐ The module packaging of the actual machine is different from that shown in the diagram.



LED and Battery Location Diagram

The memory containing the parameters, tool compensation amount, and machining programs is protected by batteries when the power is turned off. This prevents the registered data from being lost even if the power is suddenly interrupted.

When the batteries are run down, a "BAT" alarm is displayed on the NC operation panel screen. When this happens, the battery must be replaced within 1 month. Please contact the Enshu service department.

⚠ CAUTION

1. **Be aware that if the existing batteries are removed and replaced with the power turned off, the registered data will be lost.**
2. **Ordinary commercial batteries cannot be used.**

Replacement procedure

1 Press the POWER OFF pushbutton switch on the operation panel.

2 Turn off the main breaker on the control box door unit.

3 Open the control box door.

4 Turn on the main breaker with the control box door open. While doing this, use your finger to pull out the interlock attached to the main breaker.

5 Press the POWER ON pushbutton switch on the operation panel.

6 Check that the LED (red) on the CPU rack lights. When the LED is lit, this indicates that the "ER6VC3N" battery needs to be changed. The diagram on the previous page shows the positions of the LED and the batteries.

The above procedure describes the method for checking for a defective {ER6VC3N (with lead connector)} battery.

POWER MUST BE ON WHEN CHANGING BATTERIES

7 Press the POWER OFF pushbutton switch on the operation panel.

8 Turn off the main breaker on the control box door unit.

9 Remove the old battery from the connector, and take it out of the battery holder.

10 Insert the new battery into the battery holder and plug it into the connector.

NOTE

☐ Right and left in the connector may be reversed without any problems.

11) Close the control box door securely.

12) Turn on the main breaker on the control box door unit.

13) Press the POWER ON pushbutton switch on the operation panel.

CAUTION

1. Replace the battery quickly.

   Since the battery is replaced with the back door left open, the work should be done as quickly as possible (to prevent oil mist from getting into the NC unit).

2. Keep dirt out of the equipment interior.

   Take care to prevent drops of water, oil, or other contaminants from getting into the interior of each part of the equipment (such as PCBs, connectors, cables).

☐ For details regarding inspection, refer to the "YASNAC J100/J300" maintenance manual published by Yasukawa Electric

10. HEAT EXCHANGER (FAN MOTOR)

(1) INSPECTION AND MAINTENANCE

To maintain the consistent heat exchanger performance, inspection and services should be periodically performed for the following items:

1) Check to confirm that the fan motor is rotating normally.

2) Check the radiation fin for the absence of dust, oil mist or other dirty substance.

(2) CLEANING THE RADIATION FIN

1) When the fin has got dirty with dust, and other not-oily substances, blow them off using an air blower.

2) When the fin has got dirty with oil mist, and other oily substances, wash them away in water using detergent according to the following steps:

(a) Dismount every connection from the terminal board.

(b) Remove the heat exchanger from the control panel.

(c) Disassemble the mounting plate on which the fan is installed from the heat exchanger case.

(d) Wash the fin in the water using the detergent.

(e) After drying it completely, install it to the control panel in the reverse order of the removal.

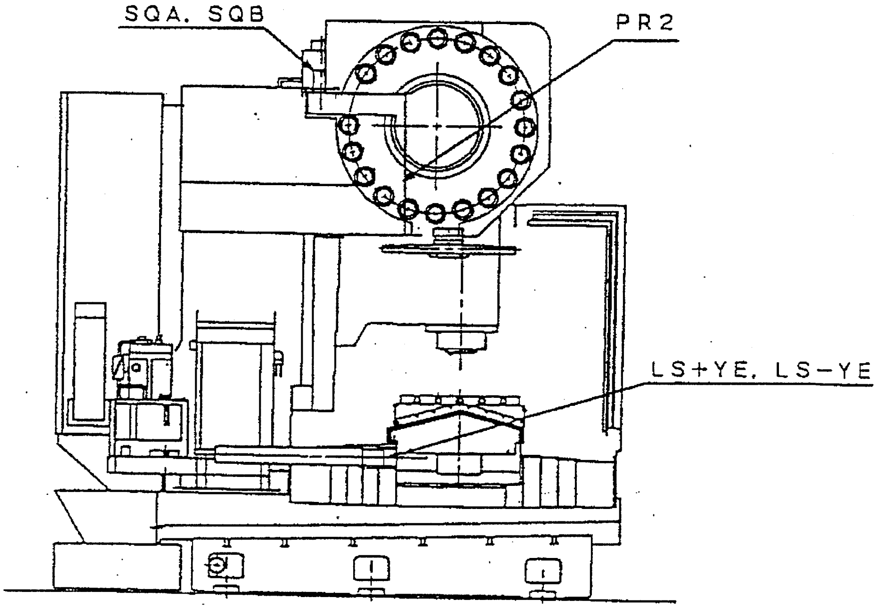
(3) AMBIENT CONDITION

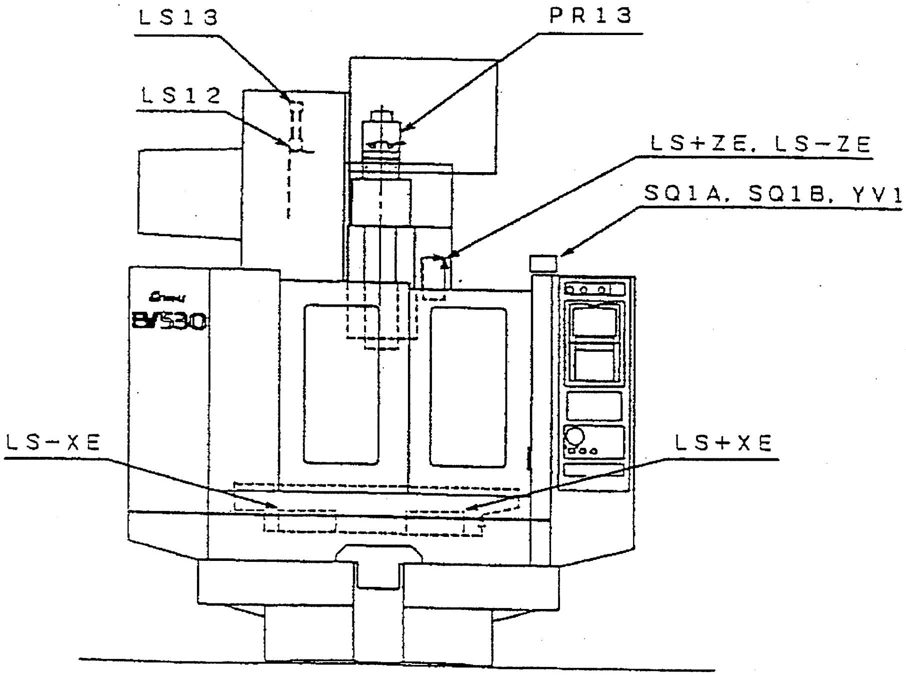
1) Avoid to use the heat exchanger where it is subject to high temperature, high moisture, corrosive gases, exessive oil mist or cutting chips, or in other abnormal atomosphere.

3-4 MAINTENANCE PARTS

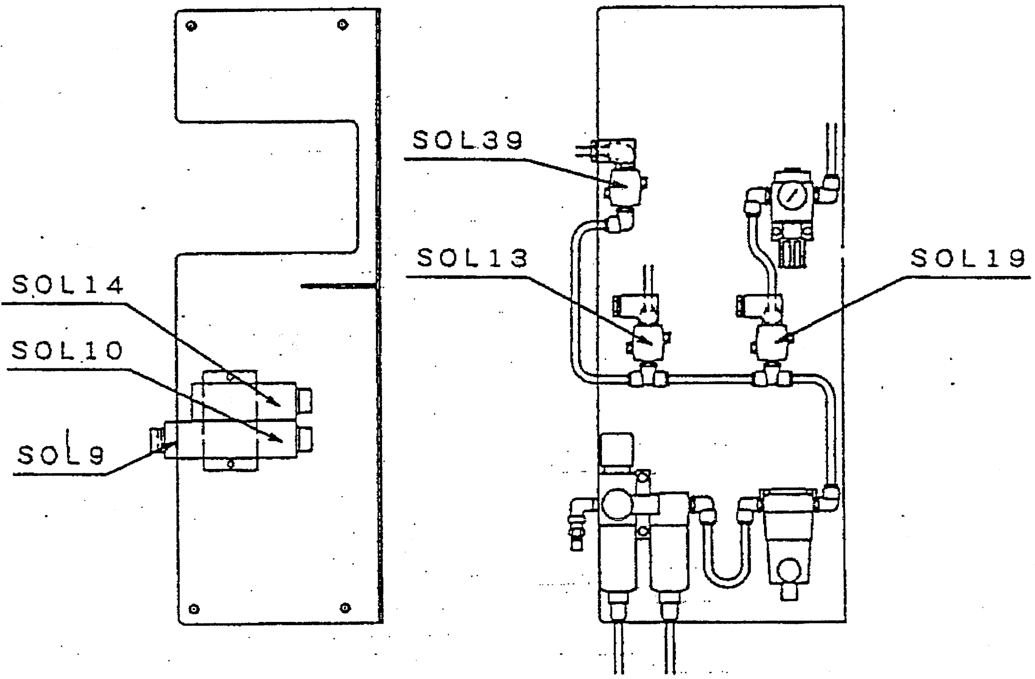
1. LOCATIONS OF LIMIT SWITCHES AND SOLENOID VALVES

(1) LOCATIONS OF LIMIT SWITCHES





(2) LOCATIONS OF SOLENOID VALVES



2. TABLE OF LIMIT SWITCHES AND SOLENOID VALVES

For the layout of limit switches and solenoid valves, please refer to page 121.

TABLE OF LIMIT SWITCHES AND SOLENOID VALVES

No.	Name	Manufacturer, Model	ENSHU Prod. No.
LS12	Magazine pot setting	Taiyo Tekko AX115	BBK 6102AQA
LS13	Magazine pot resetting	Taiyo Tekko AX115	BBK 6102AQA
PR2	Magazine deceleration	Omron E2E-X7D1-N5	BJA0003MAD
PR13	Spindle tool clamping	Omron E2E-X3D1-N-5	BJA0003MAB
PR20	ATC arm home position	Omron E2E-X7D1-N-5	BJA0003MAD
SOL9	Magazine pot setting	Daikin LS-G02-4CP-N	BBK4213JAE
SOL10	Magazine pot resetting	Daikin LS-G02-4CP-N	BBK4213JAE
SOL12	Spindle air curtain	SMC VX2330-02-5DZ-B	BBK4222WAD
SOL13	Spindle air blower	SMC VX2330-02-5DZ-B	BBK4222WAD
SOL14	Spindle tool unclamping	Daikin LS-G02-2BP-N	BBK4213IAG
SOL39	Spindle internal cooler	SMC VX-2330-02-5DZ-B	BBK4222WAD

3. LIST OF MOTORS

List of Motors Used

Name	Mfr.	Model	ENSHU Part No.
Spindle motor	Yaskawa Electric Corp.	UAASID-22SES11	
X axis feed motor	Yaskawa Electric Corp.	SGMG-30ASA	
Y axis feed motor	Yaskawa Electric Corp.	SGMG-30ASA	
Z axis feed motor	Yaskawa Electric Corp.	SGMG-44ASAAB	
Hydraulic unit	Daikin	MDR151-103H-30	BBK7053BBD
Magazine drive motor	Yaskawa Electric Corp.	UAJPEE-04DK2TU	VYR4900ABA
ATC arm motor	Miki Pulley	BMS-044-NHFN	
Coolant pump	Nanshin-kiko	HCP-250F	BMA0619AAA
Coolant pump	Nanshin-kiko	HCP-400F	BMA0620AAA
Oil cooler	Daikin	AKS55AK-F45	BBK9001DBB
Lubrication unit (option)	Showa Yuki	LCB4	BAP0115AAE

4. LIST OF CONSUMABLE PARTS

List of Consumable Parts

Name	Mfr.	Model	ENSHU Part. No.
Timing belt	Bando Chemical	250SSM400	
Halogen lamp	Nikki	G-S75	BOZ0100UAA

4 METHOD OF HANDLING PROBLEMS

4 **Method of Handling Problems** 125
- 4-1 Handling Problems 126
  1. When an Alarm Occurs 127
  2. If the Axis Feed Stroke Limit has been Activated 127
  3. Manual ATC Operation Method 128
  4. Flowchart for Steps to Take if the Machine Stops During ATC Operation 130
  5. Relationship Between Tool Change Sequence and Alarms 133
  6. Machine Alarms and Method of Handling 135
- 4-2 What to Do in a Power Failure 175
- 4-3 Points to Check Before Contacting the Manufacturer 176

4-1 HANDLING PROBLEMS

In this machine, if any kind of programming error, operation error, or problem with the machine occurs, the contents of the alarm can be displayed on the NC operation panel.

First press the COMN key, then press the soft key ALARM. The alarm message is displayed on the screen.

(1) When a programming error occurs

Revise the program and start the operation again.

(2) When an operating error occurs

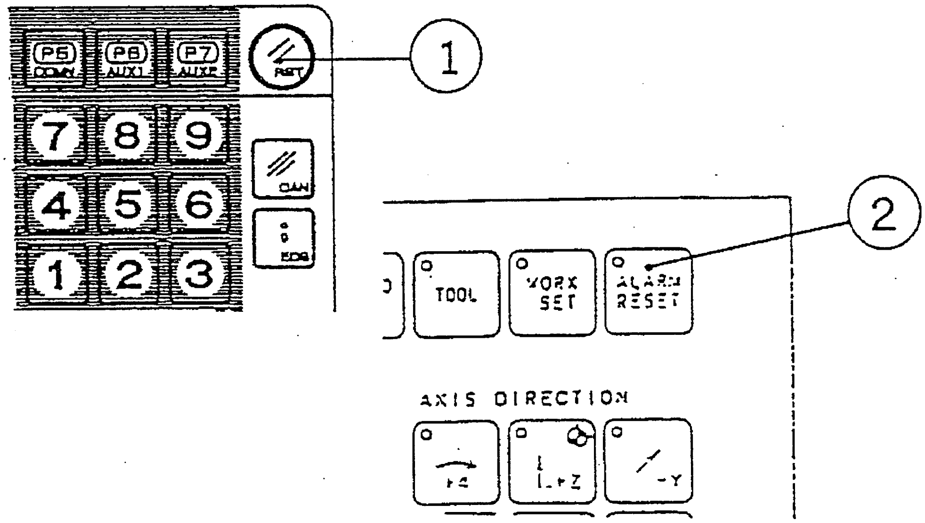
Reset the alarm, return to the initial status, and start the operation again.

(3) When a lubrication alarm occurs

When a lubrication alarm is issued, the CYCLE START switch is ineffective, and the next cycle cannot be started. If the lubrication oil is replenished, CYCLE START becomes effective.

(4) When a breakdown occurs

Correct the problem in the applicable part and press the RESET key (1) on the NC operation panel or the ALARM RESET key (2) on the machine operation panel. If possible, do not reset or turn off the power supply before the problem has been solved.



1. WHEN AN ALARM OCCURS

⚠ CAUTION

☐ **When an alarm occurs, always press the Emergency Stop button before checking for abnormalities in the detector, solenoid valve, motor, or other parts, in order to ensure safety.**

(1) Control device

Alarms related to the control device are displayed in 4-digit numbers.

Example

2190 The machine is not ready.

For details, refer to the appendix in the YASNAC J100/J300 Operator's Manual, published by Yaskawa Electric Corporation.

(2) Machine system

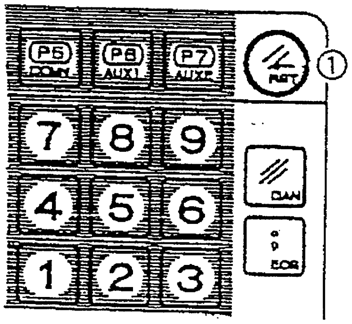
Alarms related to the machine are displayed in 4-digit numbers accompanied with an asterisk (*) for the differentiation from the control-unit related alarm numbers.

Example

1025* Amount of lubrication oil is insufficient

In this case, refer to the alarm list on the following pages. Check the content of the alarm and take the necessary corrective action.

2. IF THE AXIS FEED STROKE LIMIT HAS BEEN ACTIVATED



(1) If stored stroke limit 1 was activated

Example

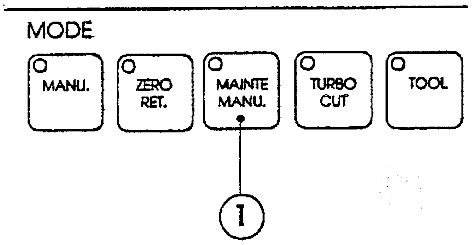
Alarm No. 2011 The axis has reached the stored stroke limit No.1 area (X axis).

When the machine reaches the end of a stroke, a stored stroke limit (soft limit) is applied. An alarm is issued, and the movement of that axis is interrupted. After reversing the direction of the axis movement, press the RESET key (1) on the NC operation panel unit to cancel the alarm.

3. MANUAL ATC OPERATION METHOD

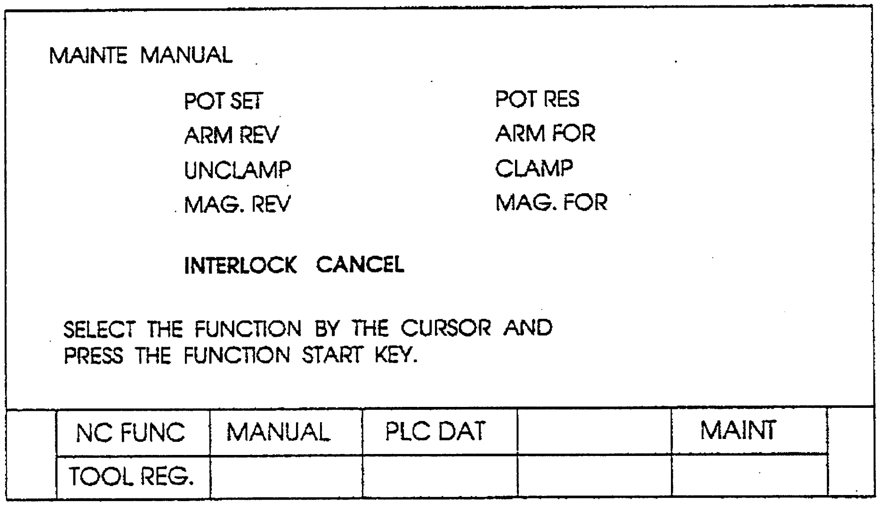
CAUTION

1. If the mode selector key is anything other than MAINTE MANU., the interlock will automatically be in effect.
2. Do not change the mode until the ATC manual operation is finished.
3. Since this is a cam type ATC, POT SET and POT RESET operations can be done normally, but other operations are generally carried out by inching. (Unlike the cylinder type of ATC, this one does not stop at the exact final point of each operation.)
4. Since the interlocks have been cancelled, be very careful about the requirements for each ATC operation.



1 Press the MAINTE MANU. mode selector key (1).

A screen such as the one below appears.



MAINTE MANUAL

POT SET   POT RES
ARM REV   ARM FOR
UNCLAMP   CLAMP
MAG. REV   MAG. FOR

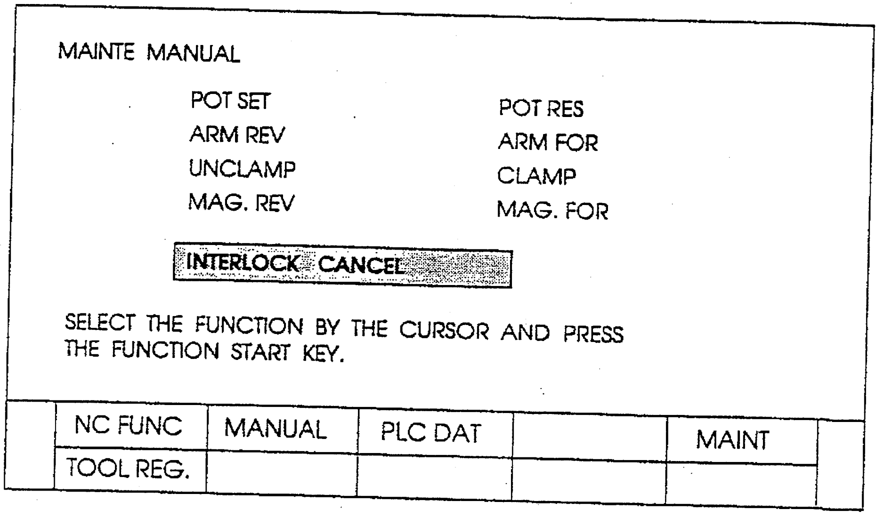
INTERLOCK CANCEL

SELECT THE FUNCTION BY THE CURSOR AND
PRESS THE FUNCTION START KEY.

NC FUNC	MANUAL	PLC DAT		MAINT
TOOL REG.				

4 METHOD OF HANDLING PROBLEMS

2 Place the cursor on ATC manual INTERLOCK CANCEL.



MAINTE MANUAL

POT SET	POT RES
ARM REV	ARM FOR
UNCLAMP	CLAMP
MAG. REV	MAG. FOR

INTERLOCK CANCEL

SELECT THE FUNCTION BY THE CURSOR AND PRESS THE FUNCTION START KEY.

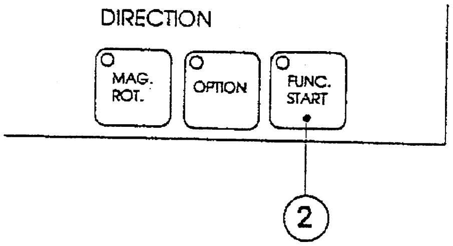
	NC FUNC	MANUAL	PLC DAT		MAINT	
	TOOL REG.					

3 Press the FUNCTION START key (2).

The interlock is cancelled.

❒ Procedure is complete.

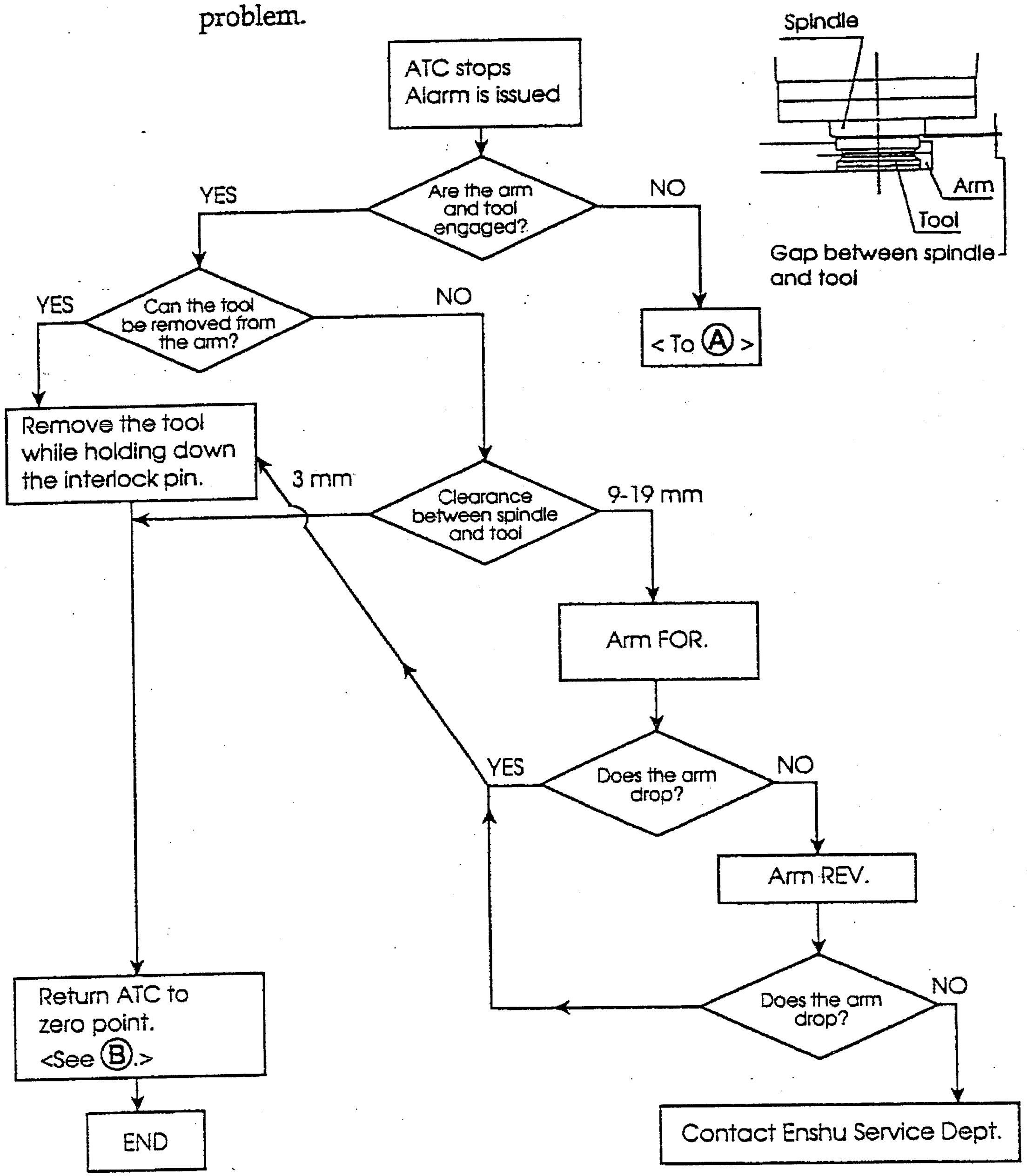
Manual operation is possible.



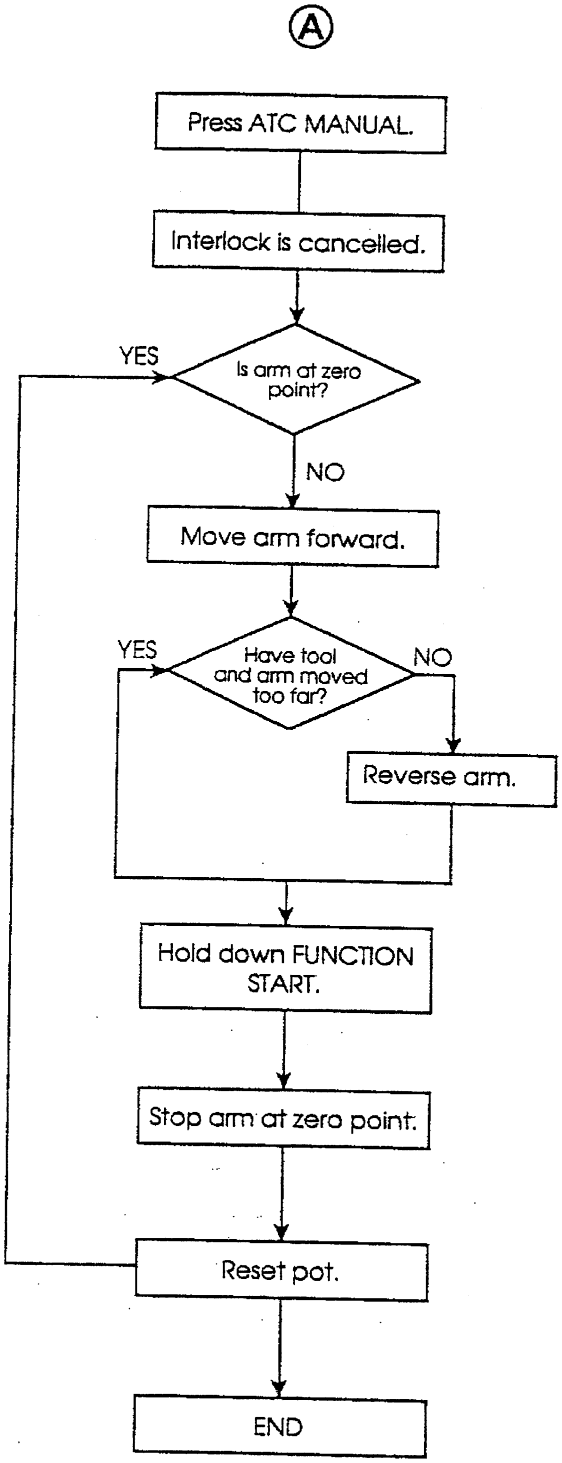
4. FLOWCHART FOR STEPS TO TAKE IF THE MACHINE STOPS DURING ATC OPERATION

(Alarm Numbers: 3225, 3227, 3232)

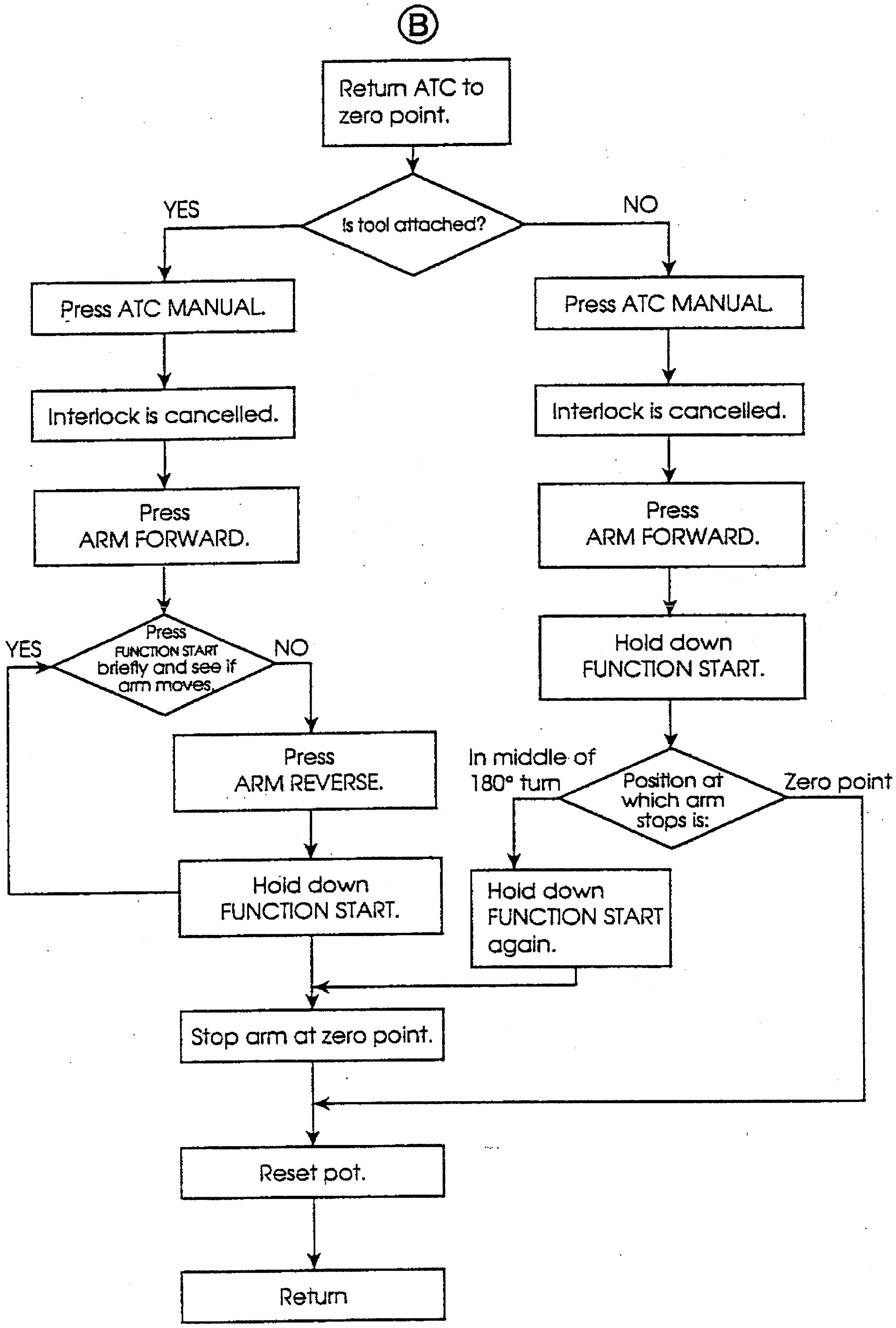
When cancelling an alarm involving the ATC system, refer to the flowchart below and take the correct steps to solve the problem.


Spindle
Arm
Tool
Gap between spindle and tool
ATC stops
Alarm is issued
Are the arm and tool engaged?
YES
NO
< To Ⓐ >
Can the tool be removed from the arm?
YES
NO
Remove the tool while holding down the interlock pin.
3 mm
Clearance between spindle and tool
9-19 mm
Arm FOR.
Does the arm drop?
YES
NO
Arm REV.
Does the arm drop?
NO
Contact Enshu Service Dept.
Return ATC to zero point. <See Ⓑ.>
END

* ATC arm must be disassembled.

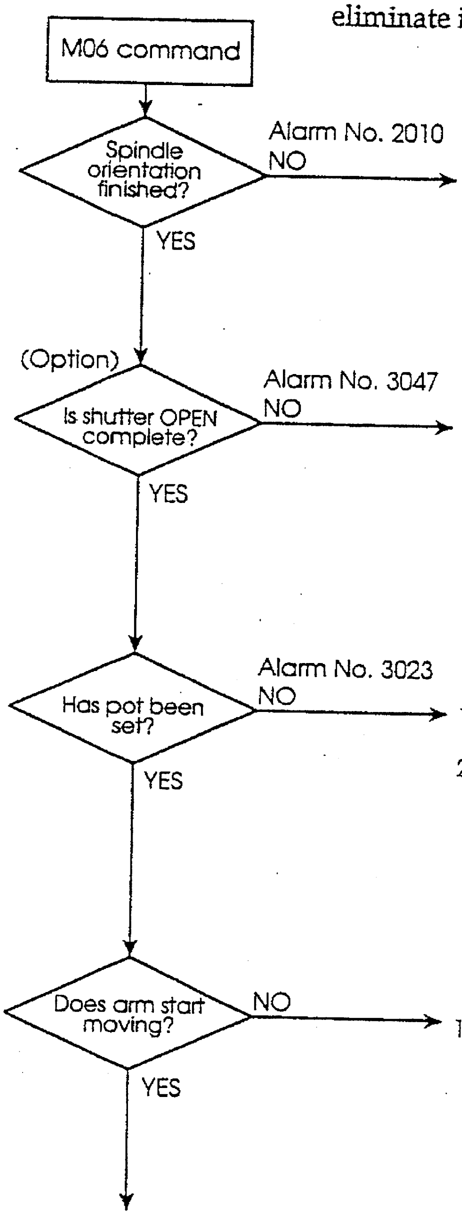

A
Press ATC MANUAL.
Interlock is cancelled.
YES
Is arm at zero point?
NO
Move arm forward.
YES
Have tool and arm moved too far?
NO
Reverse arm.
Hold down FUNCTION START.
Stop arm at zero point.
Reset pot.
END

4 METHOD OF HANDLING PROBLEMS



5. RELATIONSHIP BETWEEN TOOL CHANGE SEQUENCE AND ALARMS

The diagram below shows the relationship between the tool exchange sequence and the alarms.
Refer to the steps below to find the cause of the alarm and eliminate it.



Alarm No. 2010

1. Is the Spindle Ori. (orientation) lamp on the operation panel lighted?
2. Is there an alarm number displayed on the spindle amp?

Alarm No. 3047

1. Doesn't the shutter move at all?
2. If the operation is normal, check the limit switch input signal.

Input signal check (I/O monitor)	#1004.7... Magazine shutter closed #1004.6... Magazine shutter open
Normal operation:	#1004.7=0 #1004.6=1

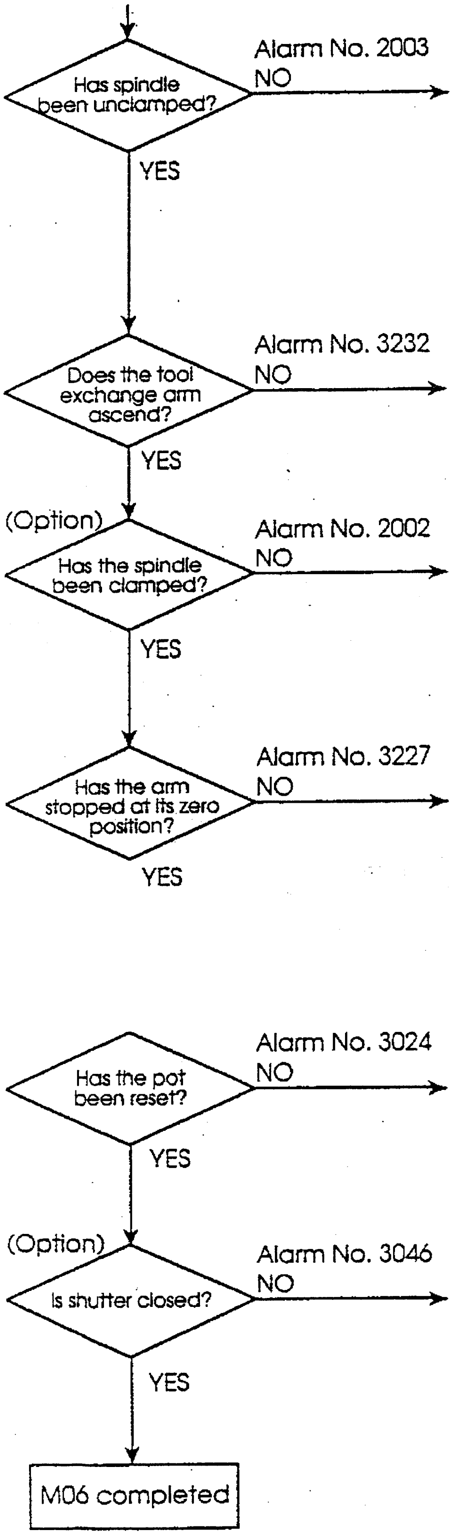
Alarm No. 3023

1. No operation at all?
2. If the operation is normal, check the limit switch input signal.

Input signal check (I/O monitor)	#1002.2... pot setting confirmation #1002.3... pot reset confirmation
Normal operation:	#1002.2=1 #1002.3=0

1. Has a thermal operation alarm been issued?

4 METHOD OF HANDLING PROBLEMS



1. If the arm has stopped partway through its cycle, return it to its initial status and then check the movements using the Spindle Unclamp switch.
2. If the movements are normal, check the limit switch input signals.

   Input signal check #1002.7...tool clamping confirmation
   (I/O monitor) Normal operation: #1002.7=0

- Check in the same way as above, when the spindle orientation was not completed.

- Check the same way as the above spindle unclamping defect.

  Input signal check #1002.7...tool clamping confirmation
  (I/O monitor) Normal operation: #1002.7=1

1. In which position has the arm stopped?
   Input signal check #1002.1...arm zero position confirmation
2. In ATC manual mode, move the arm forward.

   If the arm continues to rotate without stopping, a proximity switch may have broken down.
3. If the arm stops but passes its normal stopping position, the brake may be defective.
   (I/O monitor) Normal operation: #1002.1=1

- Check the same way as the above pot setting defect.

  Input signal check #1002.2.. pot setting confirmation
  (I/O monitor) #1002.3.. pot reset confirmation
  Normal operation: #1002.2=0 #1002.3=1

1. Doesn't the shutter move at all?
2. If the operation is normal, check the limit switch input signal.

   Input signal check #1004.7... Magazine shutter closed
   (I/O monitor) #1004.6... Magazine shutter open
   Normal operation: #1004.7=1 #1004.6=0

6. MACHINE ALARMS AND METHOD OF HANDLING

Please refer to the following "Alarm List", and eliminate the problem according to "Cause and Handling".

• Initial Settings	(1000 -)
• Spindle	(2000 -)
• Tool Magazine	(3000 -)
• T Codes	(3100 -)
• ATC	(3200 -)
• Options	(7000 -)

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1000	THE EMERGENCY STOP SIGNAL IS ON The machine is placed in the emergency stop status.	The EMERGENCY STOP button was pressed, or a problem that causes an emergency stop has occurred.	Cause of emergency stop: An emergency stop goes into effect when one of the signals below is issued. 1) #10000→ 0 : Signal that EMERGENCY STOP button was pressed 2) #10360→ 1 : Emergency stop due to main door opening (CE) 3) #10362→ 1 : Emergency stop due to magazine door opening (CE) 4) #10001→ 1 : Emergency stop due to thermal relay tripping 5) #10003→ 0 : Emergency stop due to circuit protector tripping 6) #10004→ 0 : Emergency stop due to spindle cooling unit malfunction 7) #14963→ 1 : Emergency stop due to overload during solid tap 8) #36610→ 0 : Emergency stop due to spindle servo unit malfunction 9) #35033→ 1 : Emergency stop due to feed servo alarm If the cause is anything other than the EMERGENCY STOP button signal, refer to the relevant alarm message that is displayed at the same time.	Request bit: #77000 (Ladder diagram message request coil address)

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1001	CIRCUIT PROTECTOR OPERATED The circuit protector has tripped.	One of the following circuit protectors was activated: CB7, CB8, CB10. An emergency stop took effect. #10003 → 0: Circuit protector operation	See which circuit protector operated in the control panel, refer to the circuit diagram, and check for the problem in the hardware. CB7: For 24V solenoid power CB8: For 24V control power CB10: For change arm braking power	Request bit: #77002
1002	OVERLOAD OF INDUCTION MOTOR The thermal relay was activated by a motor overload.	An overload occurred in one of the following: hydraulic pump, lubrication pump, change arm motor. An emergency stop took effect. #10001 → 1: Thermal relay tripping Option: Overload detection for oil hole, shower gun and bed wash motors is added.	See which thermal relay operated in the control panel, refer to the circuit diagram, and check for the problem in the hardware. After correcting the problem area, make sure to restore the thermal relay.	Request bit: #77003
1003	NC SYSTEM SWITCH 0 SET ERROR The NC system switch is not set to "0".	The setting of the setting parameter #109, or the rotary switch in the JCP01 print board is other than "0".	For operating the machine, set the setting parameter #109 and the rotary switch in the JCP01 print board to "0".	Request bit: #77007

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1004	FEED SERVO UNIT N.G. A problem occurred in the feed servo unit.	An abnormal servo signal was output from the NC unit. An emergency stop took effect. (#35033→ 1) **Note:** Regenerative resistor overheat detection is valid with #70023=1.	If the servo is malfunctioning, an alarm message is output from the NC unit, so refer to the "NC Maintenance" manual. Possible causes for regenerative resistor overheating include unstable power supply or unbalanced phase intervals; inspect the power supply.	Request bit: #77001
1025 (option)	INSUFFICIENCY OF SLIDE WAY OIL The lubrication oil is insufficient.	A low level of lubrication oil was detected. CYCLE START is disabled. #10007→ 1: Lubrication level low detected #70000=0: CYCLE START prohibited #70000=1: Single block ON	Replenish the oil with the specified brand. **Note:** When CYCLE START is disabled, if #70003=1, CYCLE START will be temporarily enabled while the alarm RESET button is held down.	Request bit: #77120
1026 (option)	PRESS OF SLIDE WAY OIL IS TOO LOW The lubrication oil pressure will not rise.	Though the machine has been in "ready" state (emergency stop released), a rise in lubrication oil pressure was not detected for 20 minutes or longer. #10006→ 1: Lubrication oil pressure rise detection #70001=0: FEED HOLD in effect #70001=1: Single block ON	If the lubrication oil is low, replenish it. Check the lubrication oil piping to see if there are any leaks. **Note:** #7192: Pressure increase monitor time setting...1-minute timer **Note:** The lubrication pump cycle repeats as follows: 30 seconds ON and 15 minutes stopped. In run preparation status, the pump turns on after 7 minutes for the initial cycle only. #7180: Lubrication pump ON time...1-second timer #7190: Lubrication pump OFF time...1-minute timer #7191: Lubrication pump ON time (1st time)...1-minute timer	Request bit: #77046

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1027	SPINDLE OIL COOLER IS FAULTY A problem occurred in the spindle cooling unit.	An abnormal signal was input from the spindle cooling unit. An emergency stop took effect. #10004-0: Spindle cooling unit malfunction detection After the cooling unit starts, delay for 2 seconds and then check. #8038: Spindle cooling problem monitor delay time...50ms timer	Check the spindle cooling unit for lighting up of the alarm indicator light. Refer to the instruction manual for the spindle cooling unit, and correct the problem. **Note:** If the spindle is a standard specification type, the spindle cooling unit will start operating when the power is turned on, and no external start is necessary. If the spindle is a 13000 rpm specification type, an external start is used and the spindle cooling unit starts up at the same time as the spindle starts operating. When the spindle stops, the cooling unit also stops after a 20-second delay. #8052: Spindle coolant OFF delay time... 1-second timer	Request bit: #77004
1029 (option)	PLEASE CHECK AIR PRESSURE Check the air supply.	The air pressure did not attain the rated level for 3 consecutive seconds or longer. #10026→ 1: Air pressure rise detection	Check to see if the air pressure reached 0.5MPa. Adjust with the air regulation valve. **Note:** #70184=0: Coolant stops with insufficient air pressure #70184=1: Coolant does not stop with insufficient air pressure #70185=0: Spindle does not stop with insufficient air pressure #70185=1: Spindle stops with insufficient air pressure	Request bit: #77294

Alarm No. Message Contents Cause & Corrective Action Request Bit

1034 MODE SELECT SWITCH IS FAULTY

There is a problem with the NC mode selector.

With mode selector input from the operation panel, no mode could be set for 3 seconds or longer.

The mode selector input signal input was incorrect. Diagnose the signals while operating the panel, and check to see if the following signals are on or off.

Memory : #10160
Remote : #10161
MDI : #10162
Manual : #10163
Zero return : #10164
Rapid feed : #10171
Maintenance manual : #10165

Request bit: #77051

1037 PC ERROR OF TOOL DATA READ/WRITE

A PMC error (tool data readout/write-in error) has occurred!

In the search process for the tool No. from the tool registration table, the JUSPOINT could not search the appropriate tool No. for the indexed magazine pot No. because the number of the pot exceeds the size of the table.

#7605: Pot No. data during current indexing with JUSPOINT

The environmental setting data related to the magazine is wrong.

Set the #7087 and C0-00 settings for the number of magazine pots.

#7087: Data for number of magazine pots

C0-00: Number of magazine pots (JUSPOINT parameter)

The same cause is also responsible for a write-in error.

Request bit: #77096

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1038	PC ERROR OF JOG FEEDRATE OVERRIDE	A PMC error (jog feedrate override calculation error) has occurred.	In the conversion process using the JOG feedrate override input signal, a number larger than the size of the set conversion table was specified This is a ladder circuit bug. Bits 5, 6 and 7 of internal relay #1823 cannot be used. Or the size specification for the code conversion table is wrong. #70075=1: Ignore JOG feedrate override calculation error	Request bit: #77242
1039	PC ERROR OF FEEDRATE OVERRIDE	A PMC error (feedrate override calculation error) has occurred.	In the conversion process using the feedrate override input signal, a number larger than the size of the set conversion table was specified This is a ladder circuit bug. Bits 5, 6 and 7 of internal relay #1824 cannot be used. Or the size specification for the code conversion table is wrong. #70076=1: Ignore feedrate override calculation error	Request bit: #77243
1040	PC ERROR OF SPINDLE OVERRIDE	A PMC error (spindle override calculation error) has occurred.	In the conversion process using the spindle override input signal, a number larger than the size of the set conversion table was specified This is a ladder circuit bug. Bits 3, 4, 5, 6 and 7 of internal relay #1832 cannot be used. Or the size specification for the code conversion table is wrong. #70155=1: Ignore spindle override calculation error	Request bit: #77246
1042 (option)	P.S OF SLIDE WAY OIL IS NOT OFF	The lubrication oil pressure switch was not turned off.	In the lubrication oil intermittent supply operation, the pressure switch remained on after the lapse of time set for the pump to turn off (15 minutes). #10006→ 1: Lubrication oil pressure rise detection #70002=0: FEED HOLD in effect #70002=1: Single block ON	

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
1042 (cont'd)			First check the piping to see if it is clogged up. Or the setting for the lubrication pump OFF time (standard: 15 minutes) may have been changed. #7190: Lubrication pump OFF time...1-minute timer **Note:** Problems in the supply interval are not checked by pushbutton operation.	
2000	SPINDLE AMPLIFIER IS FAULTY A problem has occurred in the spindle amplifier.	An abnormal signal was input from the spindle amp. An emergency stop took effect. #36610→0: Spindle servo unit faulty signal	Open the control box and look at the digital operator display attached to the spindle amp. If there is a problem, an F code showing the contents of the breakdown will be displayed. A detailed description of the problem will be found in the instruction manual for the spindle amp. If the malfunction can be eliminated by referring to the manual, press the RESET button on the operation panel after correcting the problem, and restore the amp to normal operation.	Request bit: #77240
2002	SP. TOOL CLAMP IS NOT COMPLETED The spindle tool cannot be clamped.	When the spindle tool unclamp command was off (tool clamp command was in effect), the tool clamp end signal did not turn on. The operation monitor time is 3 seconds. #11035→ 0: Spindle tool clamp command #11035→ 1: Spindle tool unclamp command #11027→ 1: Spindle tool clamp end detection **Note:** When the optional spindle tool unclamp end detection is installed, #11031→ 0: Spindle tool unclamp end OFF is also checked #70160=0: Tool unclamp end check is made by tool clamp end OFF. #70160=1: Tool unclamp end check is made by the special LS.		Request bit: #77092

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
2002 (cont'd)			Check the clamp end signal input on the diagnosis screen. 1) Limit switch installation position is wrong. 2) Limit switch itself has broken down. 3) Wiring to the limit switch may be defective (broken wires, loose connection at terminal strip)	Request bit: #77057
2003	SP. TOOL UNCLAMP IS NOT COMPLETED The spindle tool cannot be unclamped.	When the spindle tool unclamp command was on, the tool clamp end signal did not turn off. The operation monitor time is 3 seconds. #11035→ 1: Spindle tool unclamp command #10027→ 0: Spindle tool clamp end detection off **Note:** When the optional spindle tool unclamp end detection is installed, #10031→ 1: Spindle tool unclamp end ON is also checked #70160=0: Tool unclamp end check is made by tool clamp end OFF. #70160=1: Tool unclamp end check is made by the special LS.	In manual mode, switch the TOOL UNCLAMP button ON and OFF alternately. If the tool unclamping operation is not actually carried out, check the excitation with the solenoid valve display lamp, and determine whether the mechanical system or electrical system has broken down. If the electrical system is malfunctioning, refer to the following wiring diagrams in order: 1) Wiring to solenoid 2) Solenoid valve If the tool unclamping operation is actually carried out but an alarm is issued, the tool clamp end signal may not be off. This may be caused by one of the following: 1) Limit switch installation position is wrong. 2) Limit switch itself has broken down.	Request bit: #77080

4 METHOD OF HANDLING PROBLEMS

Alarm No. Message Contents Cause & Corrective Action Request Bit

2010 SP. ORIENTATION IS NOT COMPLETED

The spindle orientation is not complete.

With the spindle amp, the fixed position stop complete signal did not turn ON even though the spindle orientation command was output.

The operation monitor time is 10 seconds.

#31212→ 1: Spindle orientation command

#36606→ 0: Spindle orientation complete signal

Open the control box and look at the digital operator display attached to the spindle amp. If there is a problem with the spindle amp, an F code showing the contents of the breakdown will be displayed. A detailed description of the problem troubleshooting procedure will be found in the instruction manual for the spindle amp. If there is no problem with the spindle amp, monitor the input signal (V1-09)/output signal (V1-10) status using the run status display function on the operator panel, and compare it with the I/O status on the electrical circuit diagram. If they are different, check for a problem in the wiring system or the I/O module.

Note:

#70151=0: No problem check in manual mode

#70151=1: Problem check regardless of mode

Request bit: #77016

2011 (SP. S.A.R. N.G.) OR (SP. OVERLOAD)

The spindle does not attain the speed specified in the command, or the spindle motor is overloaded.

After the spindle speed command was output, the zero speed signal did not turn off within the regulation time, or the speed attained signal did not turn on.

Operation monitor time: 20 seconds + #8016 setting (x100ms)

#31202→ 1: Spindle forward rotation command

#31203→ 1: Spindle reverse rotation command

#36600→ ?: Spindle zero speed signal

#36601→ ?: Spindle speed attained signal

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
2011 (cont'd)			Open the control box and look at the digital operator display attached to the spindle amp. If there is a problem with the spindle amp, an F code showing the contents of the breakdown will be displayed. A detailed description of the problem and troubleshooting procedure will be found in the instruction manual for the spindle amp. If there is no problem with the spindle amp, monitor the input signal (V1-09)/output signal (V1-10) status using the run status display function on the operator panel, and compare it with the I/O status on the electrical circuit diagram. If they are different, check for a problem in the wiring system or the I/O module. **Note:** #70134=0: Operation complete check for spindle speed command #70134=1: No operation complete check for spindle speed command	Request bit: #77015
2018	SOLID TAP ALARM (OVERLOAD!) The solid tap is abnormal (servo turned off due to overload).	With the solid tap, a feed servo alarm was generated due to an overload during machining. An emergency stop took effect.	Check the solid tap program and review the machining conditions. The alarm is released by pressing the RESET button and clearing the solid tap mode (#35381=1).	Request bit: #77132
2079	M05 IS NECESSARY BEFORE M03-M04 The spindle rotation reverse command was given without a spindle stop command.		It is necessary to give the spindle stop command momentarily before reversing the direction of spindle rotation, except during a tap operation.	Request bit: #77014

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
2080	SP. CANNOT BE STARTED WITHOUT 'S' Give the spindle speed (S code) command.		In order to start the spindle, the rotation speed command must be given in either the same block or a preceding block.	Request bit: #77011
2083	AIR BLOW STOP IS NECESSARY SP. ROT. The spindle rotation command was given during air blower operation in the spindle.	The spindle cannot start during the air blower operation.	Stop the air blower in the spindle before starting spindle rotation. #70172=0: Alarm is issued if spindle is started during spindle air blower operation. #70172=1: Alarm is not issued if spindle is started during spindle air blower operation, but air blower is stopped and then spindle starts. **Note:** PC ROM version No.: 208A and following #70174=0: AIR BLOW goes off by the spindle start command specified during spindle-internal air blower operation. #70174=1: AIR BLOW does not go off by the spindle start command specified during spindle-internal air blower operation. #70175=0: Simultaneous operation of spindle air blower and spindle rotation is valid. #70175=1: Simultaneous operation of spindle air blower and spindle rotation is invalid. **Note:** If the settings for #70174 and #70175 do not match, the "invalid" setting takes precedence.	Request bit: #77090
3003	EXECUTE MAGAZINE ROTATION! Execute the magazine rotation operation. The magazine needs to be re-positioned.	Since the position where the magazine is now stopped is not within the "positioning complete" range, the pot setting operation cannot take place. The magazine needs to be re-positioned. A zero return is not necessary. This message is output when JUSPOINT is used in ABS mode. #10380→ 1: JUSPOINT positioning complete signal #10381→ 1: JUSPOINT automatic run positioning complete signal #10382→ 1: JUSPOINT positioning vicinity signal Pot can be set with #10380→ 1.		

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3003 (cont'd)			Since the current stopping position is not within the "positioning complete" range, the positioning command must be given again. The rotation command can be given in either manual or automatic.	Request bit: #77282
3018	POT SET AND RESET L.S. ARE ON	The limit switches for pot setting and resetting are on at the same time.	The magazine pot set detection limit switch and the magazine pot reset detection limit switch are on at the same time. #10022: Magazine pot set detection signal input #10023: Magazine pot reset detection signal input Execute the pot set/reset operations in ATC manual and check the input signal. Referring to the layout drawing of this device, check to see which limit switch is staying on.	Request bit: #77055
3021	JUSPOINT UNIT ALARM	An abnormal signal was output from the JUSPOINT unit.	An abnormal signal (#10384→ 0) is being output from the JUSPOINT unit. Check the alarm instructions displayed in the JUSPOINT unit in the control box. **Note:** If the display device on the front of the JUSPOINT unit is blinking, the point module is defective, and if the internal display is blinking, this is an inverter alarm.	Request bit: #77043
3023	POT SET IS NOT COMPLETED	The pot cannot be set.	After the magazine pot setting command was output, the pot set signal ON and the pot reset signal OFF could not be confirmed within the regulation time. Regulation time: Fixed timer #1797 Setting: 10 sec. 1) Output system malfunction Referring to the layout drawing for the device, check to see if the indicators for solenoid excitation check are lit. If there is a problem, check by referring to the circuit diagram. #11031:1 (pot set output) #11032:0 (pot reset output)	

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3023 (cont'd)			2) Detection system malfunction Check the input on the diagnosis screen. #10022:1 (pot set detection) #10023:0 (pot reset detection) Check the light of the display device for limit switch operation confirmation, referring to the layout drawing of the device. 3) Adjusment: Adjust malfunctioning hardwares, if any, and when re-adjustment bears no good result, replace the parts. (Refer to the separate material.)	Request bit: #77081
3024	POT RESET IS NOT COMPLETED The pot cannot be reset.	After the magazine pot resetting command was output, the pot set signal OFF and the pot reset signal ON could not be confirmed within the regulation time. Regulation time: Fixed timer #1798 Setting: 10 sec.	1) Output system malfunction Referring to the layout diagram for the device, check to see if the display lamp for excitation confirmation of the solenoid is lit. If there is a problem, check by referring to the circuit diagram. #11031:0 (pot set output) #11032:1 (pot reset output) 2) Detection system malfunction Check the input on the diagnosis screen. #10022:0 (pot set detection) #10023:1 (pot reset detection)	Request bit: #77082
3026	EXECUTE MAGAZINE ZERO RETURN The magazine stop position is wrong. Execute a magazine zero return.	A zero return is necessary for JUSPOINT, which controls magazine rotation. The magazine manual rotation operation is a JOG run.	When a zero return request is issued 1) Right after the power is turned on/after an emergency stop release Select zero return mode and press the magazine ROT button.	

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3026 (cont'd)			Since the zero return is carried out automatically before the T command is executed, it is OK to begin an automatic run when the zero return is incomplete. **Note:** #70685=0: Juspoint ABS mode not used #70685=1: Juspoint ABS mode used **Note:** Always use "0" for a machine for CE! #70681=0: Zero return request not issued with emergency stop #70681=1: Zero return request issued with emergency stop 2) When the JUSPOINT unit is abnormal An error message indicating JUSPOINT is abnormal is also output at the same time; refer to the cause and remedy for that alarm No.	Request bit: #77251
3046 (option)	MAGAZINE SHUTTER CLOSE ALARM! The magazine shutter is not closed.	After the magazine shutter close command was output, the closed confirmation signal ON and the open confirmation signal OFF could not be confirmed within the regulation time. Regulation time: Fixed timer #1797 Setting: 10 sec. (used together with pot setting)	1) Output system malfunction Referring to the layout diagram for the device, check to see if the display lamp for excitation confirmation of the solenoid is lit. If there is a problem, check by referring to the circuit diagram. #11057:1 (magazine shutter closed output) #11056:0 (magazine shutter open output) 2) Detection system malfunction Check the input on the diagnosis screen. #10047:1 (magazine shutter closed detection) #10046:0 (magazine shutter open detection) Check the light of the display device for limit switch operation confirmation, referring to the layout diagram for the mechanism. 3) Adjustment/hardware problem Re-adjust or replace parts. (Refer to a separate document.)	Request bit: #77495

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3081 (cont'd)		(4) Even after the above operations were completed, the magazine rotation operation could not be completed. (8) After magazine indexing, the pot movement to standby position was not completed. (16) After ATC preparation was complete, the ATC execution could not be completed. (32) The ATC execution was completed, but the command signal did not turn OFF.	(1) Give the command to move the axis to ATC position. (2) Refer to the handling of orientation problems. (4) A problem occurred during the magazine rotation operation. Refer to the handling of magazine problems. (8) A problem occurred during the operation of moving the pot to the standby position. Refer to the handling of pot problems. (16) A problem occurred during the ATC arm operation. Refer to the handling of ATC problems. (32) Execution was interrupted because an alarm was issued.	Request bit: #77331
3082	TF CYCLE ALARM - CHECK #8107 A problem occurred during TF manual run cycle processing. (Refer to register 8107.)	A problem occurred during processing of the magazine pot call-out (TF) execution cycle, so the cycle could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8107. The data for #2585 when an alarm is issued is stored in #8107. (1) When the pot moved to standby position, the return operation to the magazine could not be completed. (2) The call-out operation of the tool that was specified in the TF code could not be completed. (4) After the specified tool was called out to the standby position, call-out of the pot for returning the tool from the spindle could not be completed. (JE60 type magazine) (8) The TF execution was completed, but the command signal did not turn OFF.		

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3082 (cont'd)			(1) A problem occurred during the operation of moving the pot to the magazine side. Refer to the handling of pot problems. (2) A problem occurred during the magazine rotation operation. Refer to the handling of magazine problems. (4) A problem occurred during the magazine rotation operation. Refer to the handling of magazine problems (8) Execution was interrupted because an alarm was issued. Check the other alarm that occurred at the same time.	Request bit: #77332
3083	M6 & TF CYCLE ALARM - CHECK #8108	A problem occurred during M6 and TF manual run cycle processing. (Refer to register 8108.)	A problem occurred during processing of the M6 & TF same-block (ATC after TF) execution cycle, so the cycle could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8108. The data for #2586 when an alarm is issued is stored in #8108. (1) Even though the command for the magazine pot call-out cycle according to the TF code was sent, no response was received. (2) Even though the magazine call-out start was confirmed and the command for the pre-ATC operation cycle was sent, no response was received. (4) After the magazine operation was complete, preparation for the ATC cycle was not completed. The orientation or the pot movement to standby position could not be completed. (8) The ATC cycle operation was not completed. (1) Since a problem occurred in another cycle related to magazine control, the operation start was prohibited. Check the other alarm that is now being issued. (2) Since a problem occurred in another cycle related to magazine control, the operation start was prohibited. Check the other alarm that is now being issued. (4) A problem occurred during the operation of moving the pot to the magazine side, or there is a problem with orientation. Refer to the relevant alarm message that is being displayed, and handle the problem according to that. (8) A problem occurred during the ATC alarm operation. Refer to the handling of ATC problems.	Request bit: #77333

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

3084 M45 & TF CYCLE ALARM - CHECK #8109

A problem occurred during M45 and TF simultaneous cycle processing. (Refer to register 8109.)

A problem occurred during processing of the M45 & TF same-block (ATC after TF) execution cycle, so the cycle could not be completed within the regulation time. Alarm No. 3803 is always issued at the same time, so refer to that alarm to handle the problem.

Request bit: #77334

3086 MZ Z-RET CYCLE ALARM - CHECK #8111

A problem occurred during magazine zero return cycle processing. (Refer to register 8111.)

A problem occurred during processing of the zero return (magazines A and B) execution cycle, so the cycle could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8111. The data for #2589 when an alarm is issued is stored in 8111.

(1) The JUSPOINT control module cannot receive the request for changing to zero return mode.

1) JUSPOINT module is in alarm status

2) JUSPOINT module is operating, so mode cannot be changed

3) JUSPOINT unit is malfunctioning

(2) The JUSPOINT cannot complete the zero return

(4) The JUSPOINT control module cannot receive the request for changing to automatic run mode.

1) JUSPOINT module is in alarm status

2) JUSPOINT unit is malfunctioning

(8) The zero return execution was completed, but the command signal did not turn OFF.

(1)

1) Check the JUSPOINT module alarm that was issued at the same time.

3) Check the alarm data that is displayed in the JUSPOINT unit in the control box.

(2) Check the JUSPOINT module alarm that was issued at the same time.

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3086 (cont'd)			(4) 1) Check the JUSPOINT module alarm that was issued at the same time. 2) Check the alarm data that is displayed in the JUSPOINT unit in the control box. (8) Execution was interrupted because an alarm was issued. Check the other alarm that occurred at the same time.	Request bit: #77336
3087	MAG MANUAL CYCLE ALARM - CHECK #8112 A problem occurred during magazine manual rotation cycle processing. (Refer to register 8112.)	A problem occurred during processing of the magazine manual (magazines A and B) execution cycle, so the cycle could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8112. The data for #2590 when an alarm is issued is stored in 8112. (1) The JUSPOINT control module cannot receive the request for changing to manual run mode. 1) JUSPOINT module is in alarm status 2) JUSPOINT module is operating, so mode cannot be changed 3) JUSPOINT unit is malfunctioning (2) Not used (4) After the manual rotation operation, the magazine would not operate even though the mode returned to automatic run. A problem occurred with JUSPOINT during manual rotation.	(1) 1) Check the JUSPOINT module alarm that was issued at the same time. 3) Check the alarm data that is displayed in the JUSPOINT unit in the control box. (2) Not used (4) Check the JUSPOINT module alarm that was issued at the same time.	Request bit: #77337

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

3088 JP-UNIT Z-RET ALARM - CHECK #8100

A problem occurred during JUSPOINT zero return processing. (Refer to register 8100.)

The processing of the zero return cycle by the JUSPOINT unit control module for magazine A could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8100. The data for #2529 when an alarm is issued is stored in 8100.

(1) Even though the start command (#11360 - 1) for the zero return operation was output, the operation complete signal (#10380) remained on and would not turn off. (The zero return operation did not start.)

(2) The zero return operation started, but the operation complete signal (#10380) did not turn on.

(4) After the operation was complete, the unit could not be changed to setup mode.

(8) The setup operation was not completed.

If the "3021 * JUSPOINT UNIT ALARM" was issued at the same time, check the alarm data that is displayed in the JUSPOINT unit in the control box.

Handle according to the JUSPOINT instruction manual.

(1) Check the JUSPOINT "Parameter setting device" to see if the operation command was turned on. This can be monitored with "U0-00"

(2) Check the input of the operation complete signal #10380 on the diagnosis screen.

(4) Setup mode output:

#11362 "1"

#11363 "0"

#11364 "0"

This can be monitored by "U0-00" with the "Parameter setting device".

(8) There is a problem related to setup.

Request bit: #77360

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

3089 JP-UNIT AUTO OP ALARM - CHECK #8101

A problem occurred during JUSPOINT automatic run cycle processing. (Refer to register 8101.)

The processing of the automatic run cycle by the JUSPOINT unit control module for magazine A could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8101. The data for #2530 when an alarm is issued is stored in 8101.

(1) Not used

(2) Even though the start command (#11360) for the automatic run operation was output, the operation complete signal (#10380) did not turn on within the regulation time

(4) After the operation complete signal (#10380) was confirmed, the stop position (#2505) and the target position (#2523) did not match.

(8) Not used.

(16) Automatic run positioning complete flag (#25243) cannot be set.

If the "3021 * JUSPOINT UNIT ALARM" was issued at the same time, check the alarm data that is displayed in the JUSPOINT unit in the control box.

Handle according to the JUSPOINT instruction manual.

(1) Not used

(2) Check the JUSPOINT "Parameter setting device" to see if the operation command was turned on. This can be monitored with "U0-00". Check the input of the operation complete signal #10380 on the diagnosis screen.

(4) The operation command (#11360) output may have turned off briefly during rotation. Check the wiring for the operation command. If the NC unit version No. is not 49 or later, that version needs to be upgraded.

(8) Not used

Request bit: #77361

3090 JP-UNIT MAN OP ALARM - CHECK #8102

A problem occurred during JUSPOINT manual run cycle processing. (Refer to register 8102.)

The processing of the manual run cycle by the JUSPOINT unit control module for magazine A could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8102. The data for #2531 when an alarm is issued is stored in 8102.

(1) Even though the start command (#11360) for the manual run operation was output, the positioning approach signal (#10382) remained on and would not turn off. (Manual operation did not start.)

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
AP 3090 (cont'd)		(4) Even though the start command (#11360 - 0) turned off, the operation complete signal (#10380) did not turn on.	If the "3021 * JUSPOINT UNIT ALARM" was issued at the same time, check the alarm data that is displayed in the JUSPOINT unit in the control box. Handle according to the JUSPOINT instruction manual. (1) Check the JUSPOINT "Parameter setting device" to see if the operation command was turned on. This can be monitored with "U0-00". (2) Check the input of the operation complete signal #10380 on the diagnosis screen.	Request bit: #77362
3091	JP-UNIT JOG OP ALARM - CHECK #8103	A problem occurred during JUSPOINT JOG return cycle processing. (Refer to register 8103.) The manual run operation is automatically switched to JOG operation and to JOG is executed, only when the zero return was incomplete. The processing of the JOG run cycle by the JUSPOINT unit control module for magazine A could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8103. The data for #2532 when an alarm is issued is stored in 8103. (1) After the start command (#11360) turned off, the JUSPOINT zero speed signal (#10383) did not turn on. **Note:** With the JOG run, this is an alarm check. In this case, briefly press the RESET.	If the "3021 * JUSPOINT UNIT ALARM" was issued at the same time, check the alarm data that is displayed in the JUSPOINT unit in the control box. Handle according to the JUSPOINT instruction manual. (1) Check the input of the zero speed signal #10383 on the diagnosis screen.	Request bit: #77363
3092	JP-UNIT SETUP ALARM - CHECK #8104	A problem occurred during JUSPOINT setup. (Refer to register 8104.) The setup operation was automatically called out when the zero return was unfinished. The processing of the setup operation cycle by the JUSPOINT unit control module for magazine A could not be completed within the regulation time. You can find the step where the magazine stopped by checking the numbers in register #8104. The data for #2533 when an alarm is issued is stored in 8104. **Note:** Setup – The pot that is currently in the zero position is initialized as the specified pot No.		

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3092 (cont'd)		#2510 Setup pot No. (1) Not used (2) Even though the setup operation command (#11360 - 1) was output, the setup operation (positioning) complete signal (#10381) did not turn on. (4) When setup was complete, the specified setup No. (#2510) and the setup No. that JUSTPOINT received (#2505) did not match. (8) The setup complete flag (#25121) did not go on.	If the "3021 * JUSPOINT UNIT ALARM" was issued at the same time, check the alarm data that is displayed in the JUSPOINT unit in the control box. (1) Not used (2) Check the JUSPOINT "Parameter setting device" to see if the operation command was turned on. This can be monitored with "U0-00". Check the input of positioning complete signal #10381 on the diagnosis screen. (4) Check the specified setup No. with the JUSPOINT "Parameter setting device". This can be monitored with "U0-00". The setup received No. can also be monitored with "U0-02". If there is a discrepancy between #2510 and the monitor, or between #2505 and the monitor, check the wiring. Request bit: #77364 **Note:** The "Parameter setting device" is attached to the spindle amp, but it can also be used in the JUSPOINT unit. **Note:** Correspondence between the JUSPOINT unit monitor signal and the input/output (U0-00) STA. No0 #11375 : Station No. designation 0 STA. No1 #11376 : Station No. designation 1 STA. No2 #11377 : Station No. designation 2 STA. No3 #11380 : Station No. designation 3 STA. No4 #11381 : Station No. designation 4 STA. No5 #11382 : Station No. designation 5 STA. No6 #11383 : Station No. designation 6 STA. No7 #11384 : Station No. designation 7 STA. No8 #11385 : Station No. designation 8 START #11360 : Run command F/R #11361 : Manual rotation direction command MODE0 #11362 : Run mode 0 MODE1 #11363 : Run mode 1 MODE2 #11364 : Run mode 2	

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3092 (cont'd)			(U0-01)	
			ZNET-LS #11365 : Zero point LS signal	
			EMG #11366 : Emergency stop command	
			SVON #11367 : Servo ON command	
			RESET #11370 : Reset command	
			MULT. 0 #11371 : Pattern selection 0	
			MULT. 1 #11372 : Pattern selection 1	
			ABS. ST #11373 : Command stored in ABS memory	
			(U0-02)	
			COIN #10380 : Operation complete signal	
			COIN-A #10381 : Automatic positioning complete signal	
			NEAR #10382 : Automatic positioning approach signal	
			ZSPD #10383 : Zero speed signal	
			ALARM #10384 : Problem signal	
			POS. No0 #10385 : Present station No. 0	
			POS. No1 #10386 : Present station No. 1	
			POS. No2 #10387 : Present station No. 2	
			POS. No3 #10390 : Present station No. 3	
			POS. No4 #10391 : Present station No. 4	
			POS. No5 #10392 : Present station No. 5	
			POS. No6 #10393 : Present station No. 6	
			POS. No7 #10394 : Present station No. 7	
			POS. No8 #10395 : Present station No. 8	
			(U0-02)	
			ABS. READY #10396 :ABS memory storage complete No.	

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3175	TOOL IN SPINDLE WAS DESIGNATED The tool that was designated is in the spindle.	In a T__ command that did not accompany the tool change M code, the tool that was in the spindle was designated.	Check the spindle tool. Press the "AUX" key, then press the "PLC data" soft key. The tool registration screen will be displayed. The tool No. now in memory will be displayed in the spindle tool item. Place the cursor on that item, then you can register or change the tool No. When the M code for the tool exchange (M6/M45) is used in the same block, if the tool that is already in the spindle was specified, the operation ends at that point and an alarm is not issued.	Request bit: #77017
3185	COMMAND 'T' IN SAME BLOCK AS M06 The tool (T code) was not specified in the same block.	There is no T code in the M45 block.	When M45 is used, the T code must always be specified in the same block. M45T** ; T** is set in the spindle.	Request bit: #77047
3188	COM-T/SP-TOOL RET. POT IS NOT FOUND The specified tool or spindle tool return pot has not been registered.	An unregistered tool No. was specified.	Check the registered tool. Press the "AUX" key, then press the "PLC data" soft key. The tool registration screen will be displayed. Move the cursor, then you can register or change the desired pot or the spindle tool No. Up to 4 digits can be used for the tool No.	Request bit: #77041

Alarm No. Message Contents Cause & Corrective Action Request Bit

3220 SP-TOOL UNCLAMP ERROR! FOR ATC

A spindle tool unclamp check error occurred during the ATC.

With the tool clamp operation during the tool change cycle, tool unclamping could not be confirmed within the specified time.

The arm rotation operation was interrupted.

The standard setting for the #7652 Word data is "3C".

After the arm home position signal turns off, wait 16ms x the set value, then check to see if the tool clamp confirmation signal is off.

#10027→0 Spindle tool clamp end detection off

If the set value is too small, an alarm is issued.

If the tool unclamping operation or confirmation LS is abnormal, you can check the problem by holding down the manual TOOL UNCLAMP button for 3 seconds or longer.

Note: After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.

Request bit: #77490

3221 SP-TOOL CLAMP ERROR! FOR ATC

A spindle tool clamp check error occurred during the ATC.

With the tool unclamp operation during the tool change cycle, tool clamping could not be confirmed within the specified time.

The arm rotation operation was interrupted.

The standard setting for the #7656 Word data is "55".

After the arm home position signal turns off briefly and then back on, wait 16ms x the set value, then check to see if the tool clamp confirmation signal is on.

#10027→1 Spindle tool clamp end detection on

If the set value is too small, an alarm is issued.

Note: After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.

Request bit: #77491

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3222	ATC ARM STOP TIMING DATA ERROR! The ATC arm forward stop timing data is incorrect!	The content is the same as that of Alarm No. 3223.		Request bit: #77492
3223	ATC ARM POSITION OVERRUN ERROR! An ATC arm fixed position overrun occurred.	In the final stage of the tool change, the stop command was output with the arm home position signal, but the ATC arm overran the arm home position and stopped.	The standard setting for the #7660 Word data is "01". At the end of the tool change, 16ms x the set value after the arm home position signal turns on, the ATC arm stop is output. If the arm stop output timing is late, there is a risk of overrunning the arm home position. Check the data. This is also issued when something is wrong with the movement of the ATC arm brake. Check around the ATC arm brake. **Note:** After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.	Request bit: #77493
3224	Z-AXIS IS NOT IN ATC POSITION The Z axis is not at ATC position.	The tool change command was given without a command to move the Z axis to ATC home position.	One of the conditions for the tool change operation is that the Z axis must be at its 1st zero point. If the Z axis is not at its 1st zero point, give the command for axis movement at the same time. G91 G28 Z0 M6;	Request bit: #77494

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

3225 BRING THE POT AND ATC TO INITIAL POS.

Return the pot and the ATC arm to their initial positions.

The pot setting status and arm home position conditions have not been satisfied.

Pot setting status

At the end of the tool change, 8ms x the set value after the arm home position signal turns on, the ATC arm stop is output.

#11032→ 1: Pot reset output

#11023→ 1: Pot reset detection input

#11022→ 0: Pot set detection input

Arm home position

#10021→ 1: Arm zero-positioning detection input

Execute pot reset and arm rotation in ATC manual operation, and return to home position.

Note: The arm home position signal turns on once even if the arm is rotating.

Always visually check the arm home position.

Note: After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.

Request bit: #77050

3227 ATC ARM WAS NOT COMPLETED IN TIME

The ATC arm operation was not completed within the regulation time.

At the 2nd level, the time over check for the ATC arm rotation time took effect.

Operation monitor time 5 seconds

The operation check takes place at high speed for the 1st level. This 2nd level alarm is a safety measure that takes place if for some reason the 1st alarm check did not occur.

Check the registered data for the ATC timing.

4 METHOD OF HANDLING PROBLEMS

Alarm No. Message Contents Cause & Corrective Action Request Bit

3227
(cont'd)

Timing Data Setting of Cam Type ATC

Address	Content	Standard setting	
		50Hz	60Hz
1) #7650	Tool unclamp timing	04	01
2) #7652	Tool unclamp confirmation	3C	3C
3) #7654	Tool clamp timing	20	1A
4) #7656	Tool clamp confirmation	55	55
5) #7658	Arm advance stop timing	FF	FF
6) #7660	Arm stop timing	01	01

Note: #7226 is the preset value of the timing counter

Note: Since each register is processed as 2-byte data, always set the next address to "0".

Note: After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.

Request bit: #77086

3232 SP ORI. IS NOT COMPLETED IN M06

The spindle fixed position signal was turned off during ATC operation.

After the ATC operation starts, check the spindle fixed position signal with the timing for turning the arm home position signal back on. If the arm is at the lower end where the tool is unclamped, check the spindle fixed position before it rises.

#36606→ 1: Spindle fixed position stop complete signal input

#31212→ 1: Spindle fixed position stop command output

The monitor display lamp for the spindle fixed position stop complete signal is on the operation panel.

The spindle orientation re-inspection and ATC arm re-inspection are only necessary for making judgments during the actual tool change operation.

#70555=0: Check spindle fixed position stop signal during ATC operation

#70555=1: Do not check spindle fixed position stop signal during ATC operation

Note: After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.

Request bit: #77204

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
3281	ATC TORQUE LIMITER WAS RELEASED During the ATC, the axis was outside the area where the arm operation can take place.	During the ATC operation, the Z axis was not at its 1st zero point. ATC operation was interrupted. #36302→ 1: Z axis 1st zero point signal	Normally, an interlock takes effect in the Z axis at the same time that the ATC arm starts rotating. **Note:** After returning the arm/pot to home position in ATC manual, always check to make sure the actual tools and the tools in memory (spindle and standby position pot) match.	Request bit: #77486
7003 (option)	FILTER UNIT CLOGGED The filter unit is clogged up. Clean it for 15 seconds.	Clogging was detected in the filter unit used for the high pressure coolant pump. Clean the filter for 15 seconds. After that, check on the clogging detection signal will not be made for 60 seconds. If it continues and the abnormal clogging signal is kept turned on for the regulation time, an alarm will be issued and FEED HOLD will take effect.	#10057→ 1 : Filter clogging detection signal #8053 : Clogging cleaning time 1-sec. Timer #8014 : Re-detection ignore time after cleaning 1-sec. Timer #8058 : Additional re-detection ignore time after cleaning 1-sec. Timer #8057 : Continued input monitor time for continuous clogging detection signal 1-sec. Timer #70197=0 : Check for problems with continuous clogging detection #70197=1 : Do not check for problems with continuous clogging detection	Request bit: #77292

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7004 (option)	THERMAL/TORQUE TRIP OF CONVEYOR The thermal relay or torque limiter was activated due to a chip conveyor overload.	#10055→1: Operation detection input for chip conveyor torque limiter #10002→1: Operation detection input for chip conveyor thermal relay CYCLE START is prohibited.	Check the condition of clogging by chippings within the chip conveyor. M31: Chip conveyor forward rotation M32: Chip conveyor stop M33: Chip conveyor reverse rotation	Request bit: #77211
7008 (option)	AUTO CORE EQUIPMENT UNIT ALARM A problem occurred with the automatic centering measurement unit.	Not used		Request bit: #77012
7009 (option)	AUTO TOOL LENGTH MEAS. IS FAULTY A problem occurred with the automatic tool length measurement unit.	An abnormal signal was input from the automatic tool length measurement unit. FEED HOLD went into effect.	The safety limit switch at the stroke end of the automatic tool length measurement unit was activated. Check the unit. #10072→0: Automatic tool length measurement unit problem detection #10072→1: Automatic tool length measurement unit normal detection Since it is input with part B, a problem occurs if the unit is removed. In this case, set to "invalid" with the parameter. #70842=1: Automatic tool length measurement unit is installed	Request bit: #77010

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7014 (option)	4th AXIS CLAMP/UNCLAMP L.S. ARE ON The 4th axis clamp & unclamp limit switch signals are on at the same time.	The 4th axis clamp confirmation signal and unclamp confirmation signal were on simultaneously for longer than the regulation time.	#10064 1: 4th axis clamp end confirmation signal #10065 1: 4th axis unclamp end confirmation signal Execute clamping/unclamping with M code manual operation, look at the signal change, and check for problems. M10: 4th axis clamping M11: 4th axis unclamping Handle problems according to the instruction manual issued by the 4th axis manufacturer.	Request bit: #77053
7016 (option)	TOOL LENGTH MEASUR. FORWARD ALARM The automatic tool length measuring unit cannot move forward.	After the automatic tool length measuring unit forward command was output, the forward end confirmation was not detected within the regulation time. Regulation time 5 seconds	#11074→ 1: Automatic tool length measuring unit forward output #10070→ 1: Automatic tool length meas. measuring unit forward end detection #10071→ 0: Automatic tool length measuring unit backward end off Give the forward/backward command with M code manual operation, and check the actual operation and the detection signal input. M41: Automatic tool length measuring unit forward M42: Automatic tool length measuring unit backward	Request bit: #77297

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

7017 (option)

TOOL LENGTH MEASUR. BACKWARD ALARM

The automatic tool length measuring unit cannot move backward.

After the automatic tool length measuring unit forward command was output, the backward end confirmation was not detected within the regulation time.

Regulation time 5 seconds

#11075→ 1: Automatic tool length measuring unit backward output

#10070→ 0: Automatic tool length measuring unit forward end off

#10071→ 1: Automatic tool length measuring unit backward end detection

Give the forward/backward command with M code manual operation, and check the actual operation and the detection signal input.

M41: Automatic tool length measuring unit forward

M42: Automatic tool length measuring unit backward

Request bit: #77320

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7018 (option)	4TH AXIS CLAMP ALARM The 4th axis cannot be clamped.	The 4th axis clamping operation could not be confirmed within the regulation time. Regulation time 5 seconds	#10064 1: 4th axis clamp end confirmation signal #10065 1: 4th axis unclamp end confirmation signal #11064 : 4th axis clamp command output #11065 : 4th axis unclamp command output Execute clamping/unclamping with M code manual operation, look at the signal change, and check for problems. M10: 4th axis clamping M11: 4th axis unclamping Handle problems according to the instruction manual issued by the 4th axis manufacturer.	Request bit: #77126
7019 (option)	4TH AXIS UNCLAMP ALARM The 4th axis cannot be unclamped.	The 4th axis unclamping operation could not be confirmed within the regulation time. Regulation time 5 seconds	#10064 1: 4th axis clamp end confirmation signal #10065 1: 4th axis unclamp end confirmation signal #11064 : 4th axis clamp command output #11065 : 4th axis unclamp command output Execute clamping/unclamping with M code manual operation, look at the signal change, and check for problems. M10: 4th axis clamping M11: 4th axis unclamping Handle problems according to the instruction manual issued by the 4th axis manufacturer.	Request bit: #77127

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7022 (option)	RETURN TOOL LENGTH UNIT INITIAL P Return the automatic tool length measuring unit to its initial position.	Just after the reset in automatic mode, the automatic tool length measuring unit was not at the backward end and the initial position was wrong.	Give the backward command with M code manual operation. M42: Automatic tool length measuring unit backward #11075→1: Automatic tool length measuring unit backward output #10070→0: Automatic tool length measuring unit forward end off #10071→1: Automatic tool length measuring unit backward end detection	Request bit: #77321
7024 (option & CE)	MAGAZINE COVER IS NOT CLOSED The magazine cover is not closed.	**Standard machine:** An interlock that disables rotation took effect while the magazine was rotating. Only the magazine stops. **CE:** The magazine safety cover was opened. An emergency stop took effect.	**Standard machine:** Do not open the magazine cover while the magazine is rotating. The pot reset confirmation signal turned off. **CE:** Do not open the magazine cover during ATC execution. Do not open the magazine cover during spindle rotation Do not open the magazine cover during automatic rotation. Do not open the magazine cover while the magazine is rotating. #10023 1: Pot reset confirmation signal #10051 1: Magazine cover closed confirmation signal #10363 1: Magazine door closed confirmation signal (CE)	Request bit: #77097

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7036 (option)	LACK OF COOLANT OIL The coolant oil has reached its lower limit.	The lower limit of coolant oil was detected. Detection lag time 10 seconds Setting with #8054 1-sec. timer	Replenish the coolant oil. #10056 1: Coolant oil lower limit detection float switch input #70195=0: Stop coolant; start FEED HOLD #70195=1: Display caution message only; do not stop	Request bit: #77296
7037 (option)	INSUFFICIENCY OF TAP COOLANT OIL The tap coolant is insufficient.	The lower limit of tap coolant oil was detected. CYCLE START is prohibited.	Replenish the tap coolant oil. #10015 1: Tap coolant oil lower limit detection float switch input #70231=0: Tap coolant oil insufficient check valid #70231=1: Tap coolant oil insufficient check invalid #70232=0: Tap coolant oil insufficient single block processing #70232=1: Tap coolant oil insufficient CYCLE START prohibited **Note:** #70791=1: Tap coolant specification	Request bit: #77056
7057 (option)	SPINDLE OIL COOLER FILTER ALARM The line filter for the spindle cooling unit is clogged.	Clogging was detected in the line filter for the spindle cooling unit. CYCLE START is prohibited.	Clean the filter. #10060 1: Clogging detection input for spindle cooling unit line filter #70776=0: Spindle coolant abnormal detection function invalid #70776=1: Spindle coolant abnormal detection function valid **Note:** #70767=1: Spindle high speed rotation specification	Request bit: #77441

4 METHOD OF HANDLING PROBLEMS

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit

7058 (option)

LACK OF SPINDLE COOLANT

The coolant for the spindle cooling unit is insufficient.

The lower limit of coolant for the spindle cooling unit was detected.

CYCLE START is prohibited.

Replenish the coolant.

#10061=1: Spindle coolant lower limit detection float switch input

#70776=0: Spindle coolant abnormal detection function invalid

#70776=1: Spindle coolant abnormal detection function valid

Note: #70767=1: Spindle high speed rotation specification

Request bit: #77442

7059 (option)

FLOW OF SPINDLE COOLANT N.G.!

A problem was detected with the amount of flow in the spindle cooling unit.

When the spindle started, an insufficient amount of flow through the spindle cooling unit was detected.

FEED HOLD took effect, and the spindle stopped.

Start the spindle cooling unit and spindle rotation at the same time. Two seconds after starting, begin checking the amount of flow. Check also filter clogging and the amount of coolant.

#10062 1: Spindle cooling unit flow normal input

#70776=0: Spindle coolant abnormal detection function invalid

#70776=1: Spindle coolant abnormal detection function valid

Note: #70767=1: Spindle high speed rotation specification

For spindle cooling unit malfunction and low flowrate detection, the check is made with a certain time lag after the cooling unit starts. This time lag is set on the timer.

Detection lag time	2 seconds	Set in #8038	50ms timer

Request bit: #77443

Alarm No.	Message	Contents	Cause & Corrective Action	Request Bit
7077 (option)	TOOL EXCEEDS LIFE TIME The tool life of the group to which the tool belongs is over.	The life of all the tools in the group subject to the tool life management function has been used up. In a memory run, CYCLE START is prohibited.	Refer to the tool life management function in the J300 instruction manual, and change the tool that has been used up. #70050=0: CYCLE START prohibited when tool group life is exceeded #70050=1: CYCLE START valid even when tool group life is exceeded; machining executed with last tool	Request bit: #77201
7078 (option)	TOOL IS BROKEN. PLEASE CHANGE TOOL The tool is broken. Please change it.	A broken tool was detected by the tool breakage detection function. FEED HOLD takes effect.	Change the broken tool and re-register the tool data. #1007.4=0: Tool breakage detection **Note:** #70840=1: Tool breakage detection specification	Request bit: #77203

4 METHOD OF HANDLING PROBLEMS

When alarm No. 3021 is issued (abnormal signal is output from JUSPOINT unit), refer to the JUSPOINT unit alarm list below.

The display shows 7 segments on the point module PCB. This is a blinking display. (When the lamp remains lit continuously, it is a status display.)

JUSPOINT UNIT ALARM LIST

Blinking Display	Alarm Message
0	Operator's alarm detected (contents are displayed on operator's side)
1	PG error (including wiring defect)
2	Emergency stop was activated.
3	After turning on power, run command was given without setup operation.
4	Zero point LS was not detected when automatic setting of zero point offset amount was executed.
5	Zero point LS was not detected when zero return operation was executed.
6	Command was issued for undefined station No.
7	Run mode is not set correctly.
8	Command was issued for automatic setting of zero offset amount even though the mode has been set to parameter setting mode.
9	Zero point LS position error (zero point LS position is too close to Z phase position; should be ±120)
A	Zero offset amount is inappropriate (outside 120~12,000 range)
B	When backlash amount is other than "0", • Command was issued for automatic setting of zero offset amount • Command was issued for setup operation with no zero return operation (excluding in ABS mode) Backlash amount is greater than single station pulse amount. (Set value smaller than single station pulse amount.)
C	

Blinking Display	Alarm Message
D	Storing data in memory is not complete in ABS mode. It is necessary to reset, then execute zero return.
E	
F	
Blank	MCU error

To cancel the alarm, reset the equipment (issue the reset signal). In case of a blank display (MCU error) reset the power.

4-2 WHAT TO DO IN A POWER FAILURE

- If the power fails while the machining center is operating, the NC devices and power control box panel go off, all specified values are cleared, and the machine itself stops moving.
- The machine will not resume movement until the power has been turned off and then on again, even when the power failure has been corrected.
- After turning on the power, establish the correct position and conditions for operation using ATC manual, MDI, or similar operation.
- If the power fails during axis movement, an "Absolute position detection error" alarm (No. 2131~2135) may be issued when the power is turned back on. If this happens, press the MAINT key, press the "Parameter" soft key (upper row), and press the "Setting" soft key (lower row). First, search for pm8001 and change the bit that is set to "1" to "0". After that, press the "Setting" soft key (lower row) once again, search for #109, and return the setting to "0". Finally, press the RESET key. If the alarm turns off, the procedure is finished.

4-3 POINTS TO CHECK BEFORE CONTACTING THE MANUFACTURER

NOTE

☐ **If a problem occurs and you are not sure how to handle it, check the items below before contacting the manufacturer.**

1. Model name
2. Control device name
3. Serial number (machine production number)
4. Number of alarm displayed on screen
5. What was happening when the alarm occurred

   (Examples)

   - The spindle was bumped.
   - The precision was off after a change in setup.
   - The program was modified.
   - The EMERGENCY button was pressed.
6. First try whatever steps may be described in the instruction manual, and check the results.

   (Example)

   - One alarm disappeared, but another occurred.
7. What state is the machine in at the moment?

   (Examples)

   - The ATC has stopped before being completed.
   - The alarm does not disappear.

5 APPENDIX

5 Appendix 177
  5-1 User Macro Common Variables Usable Ranges 178
- Rotor Pack Maintenance Procedure of the Oil Cooler .... (1-4)

5-1 USER MACRO COMMON VARIABLES USABLE RANGES

In ENAC, #100~#149 and #500~#999 are available as common variable ranges. Within these, the ranges available to users are as follows.

#100~#299

The #100~#199 range is used when any of the following functions has been added: automatic centering, measurement, tool length measurement/tool breakage detection, or coordinate compensation. Therefore, the #200~#299 range can be used in macro program to be created by the user.

When none of the above options are included, the entire range can be used.

#500~#999

(1) Automatic centering (2) Measurement (3) Coordinate compensation	(4) Tool length measurement/tool breakage detection	#500	The various options use the common variables shown in the chart at the left. When there are no options, the comon variables for the entire range can be used. <#500~#599 range > This range cannot be used if any one of the options (1), (2), or (3) are included. When only (4) is included, #550~#599 can be used. However, regardless of what options are included, #900~#999 cannot be used.
		#550	
ENAC Tomato		#600	
TURBO CUT (one piece machining)		#900	Use prohibited
ATC BG_JOB Other		#950	Use prohibited
		#999	Use prohibited

NOTES